# PETS

## *and How to Care for Them*

*By*

**LEE S. CRANDALL**

*Curator of Birds*

NEW YORK ZOOLOGICAL PARK

LOS ANGELES MUSEUM
EXPOSITION PARK

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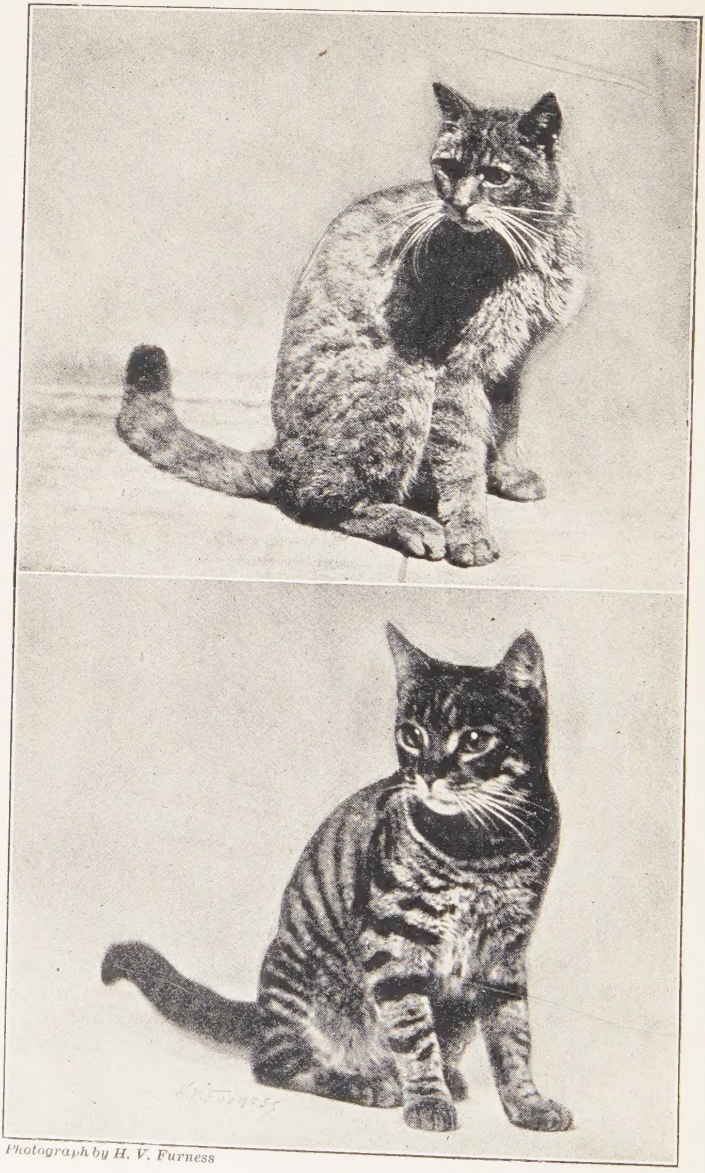

*Photograph by H. V. Furness*

European Wild Cat (above)
Domestic Striped Tabby Cat (below)

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## AND HOW TO CARE FOR THEM

BY

LEE S. CRANDALL

Curator of Birds, New York Zoölogical Park; Fellow of the New York Zoölogical Society; Member of the American Society of Ichthyologists and Herpetologists; Associate Member of the American Ornithologists' Union, etc.

WITH ILLUSTRATIONS FROM LIFE

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TO MY PARENTS

who endured much from a
pet-loving son

# PREFACE

Every normal child, of whatever race or creed, is born with an innate love for wild things. If allowed to languish from lack of intelligent parental interest and supervision, this natural instinct is gradually lost or degenerates into the unintentional cruelty of ignorance. Properly fostered and developed, it is certain to exert a beneficent influence on the trend of developing character. Given scope and sympathetic guidance, the young mind is trained to observe and appreciate the subtle ways of nature, an accomplishment which, in later years, will prove, if nothing more, a welcome diversion. The sterling qualities of kindness, responsibility and regularity are acquired, and many of the problems which perplex the adolescent adjust themselves normally by constant contact with reproductive life.

By necessity, the choice of creatures mentioned in this book has been arbitrary. The scope of the word "pet" may seem, in some cases, to have been stretched, and in others restricted, but no species has been included or omitted without careful consideration. To give, in a single volume, full and efficient directions for the treatment of so many diverse creatures, means that the space devoted to each must be no greater than necessary. For this reason, rare or particularly delicate members of the various groups have been excluded. Such animals as the lamb, calf, colt, etc., have not been mentioned, as their care generally is well understood by those in a position to keep them. On the other hand, many of the birds, such as the pheasants, cranes and waterfowl, cannot be considered as pets in the sense

that they may be fondled, but they are widely kept for ornamental purposes, and their proper treatment is a matter often not well known.

No attempt has been made to give detailed descriptions of wild species, except in so far as to make identification reasonably easy. Domestic breeds have received more attention in this respect, as their colors and markings are more variable than those of forms unaffected by the conditions of long-continued confinement. Since captivity is here the keynote, wild habits, in most cases, have not been dwelt on. Collateral reading of books chosen from the many devoted to that phase of the subject is strongly advised.

Except in a few cases, notably the birds, reference to disease has been brief. If sick animals do not respond quickly to the simple household remedies which suggest themselves, a veterinary should be summoned, or the sufferer destroyed. To attempt to treat a creature that is seriously ill is a task which only a trained person should assume. Bird diseases, however, have received scant attention from investigators, and the little space devoted to them here will not be amiss.

The question of scientific breeding may seem somewhat erudite for the field indicated by the title of this work. Its importance is so great, however, that a few words, outlining the fundamentals, have been added as an appendix.

For those who desire more extensive information than is given here, a list of practical works is given. To many of them I am indebted for reference during the preparation of this volume, and hereby make full acknowledgment.

To Dr. William T. Hornaday, Mr. William Beebe, Mr. Raymond L. Ditmars and Mr. Elwin R. Sanborn, I am grateful for much invaluable assistance and advice, which have greatly facilitated my work. Mr. Kenyon V. Painter, Mr. Percy Warner, Mrs. Harriet V. Furness and the New

York Zoölogical Society have contributed several illustrations, for the use of which I am much indebted.

Photographs not otherwise credited were taken by the author, most of the subjects being included among the exhibits at the New York Zoölogical Park. The goldfishes are the property of Mr. Joseph Taubles, while the tropical fishes are from the author's private collection.

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L. S. C.

New York Zoölogical Park,
January, 1917.

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# SECTION I

# MAMMALS

# CHAPTER I

## DOGS

WHAT shall we say of the dog? The close companion of man almost from the beginning, his praises have been sung in every tongue. The literature of the world contains countless eulogies of his devotion and courage, so that little now remains to be said. The savage wolf-dog of our almost equally savage ancestors has become the pampered pet of modern civilization; but the sterling characters which made him indispensable in those old days have increased with the passage of time. That the dog was of the utmost importance to primitive man we may not doubt. His services to men who lived chiefly on meat must have been incalculable, and it is probable that to this fact the domestication of the dog is due. Aboriginal men in all parts of the world still have their packs of half-wild dogs, often obviously descended, at least in part, from native feral species.

Just when the dog first became associated with man we do not know. The facts are shrouded in the mysteries of the origin of our race itself, but it must have occurred at a very remote period, for the Romans had well-established breeds, separated into groups, according to their ability in hunting, running, fighting, flock-tending, etc.

The ancestry of the dog has been the occasion of much controversy. Many naturalists have considered that it is descended from a single ancestor, such as the common wolf of Europe. The wonderful diversity in breeds of modern dogs has been held to disprove this claim and point to a number of foundation strains. But a consideration of the equal variation among other domestic creatures, noticeably

the fowl and the pigeon, known to have been derived from a single wild species, lessens the force of the argument.

Darwin,* however, leans toward the theory of multiple origin, and advances much convincing proof in support of his belief. It is well known that many savage tribes have dogs which appear to be simply half-tamed representatives of the particular wild-dog-like animals inhabiting the same regions. The dogs of the American Plains Indians closely resemble the small prairie wolf or coyote; the husky of the north country is plainly not far removed from the gray wolf; the German sheep-dog and the Samoyede are strikingly wolf-like in appearance. Whether our present dogs are the result of crossing these many simple derivatives of wolves and jackals among themselves, or whether there was an original ancestral dog, now extinct, with which the blood of other species has become mingled, we do not know. Domestic dogs have been shown to be perfectly fertile, for several generations, with various wild species.

According to Mivart,† the Dingo (*Canis dingo*) is the only wild dog still existing which meets the requirements of an ancestor of our modern breeds. This species is found throughout Australia, and fossil bones which have been found show its presence there, from very early times. There is reason to believe, however, that, remote as the period must have been, the Dingo was introduced by man and is not indigenous to Australia. It is certain that the Dingo lends itself to captivity and is frequently kept by the natives, whose dogs bear evidence of free interbreeding with the wild species. This is a feature of great interest, and it may be that in the Dingo we have an animal representing the foundation stock of the domestic dog.

* Darwin, Charles: *Animals and Plants Under Domestication* (Westminster Edition), pp. 14-43.

† Mivart, St. George: *A Monograph of the Canidæ*, 1890, p. 168.

Dingo (above)
Gray Wolf (below)

### General Care

In considering the care of the dog, the particular breed or type of the individual is of prime importance. The large, hardy sorts are better off for a certain amount of cold and exposure, and if a snug kennel is provided, will do very well without heat. The more delicate toys, to remain in good health, must have warm, dry quarters.

If it is decided that the dog is to remain out of doors, a well-ventilated, rain-proof, draughtless kennel, of sufficient size, should be provided. Straw makes the best bedding and should be changed frequently. If the dog can be given regular daily exercise, he may at other times be chained to the kennel. If this is not possible, a run of stout wire should be built or a ring-and-wire trolley arranged so that the animal may have some freedom. To chain permanently an active, healthy dog is an act of cruelty which is certain to result in the bad temper which is usually characteristic of "watch-dogs."

Dogs of medium size, which are suitable for house-dogs, should be given a special sleeping-place, preferably in a little heated part of the house. Most dogs are better if not cuddled.

The tiny lap-dogs require more attention. It is best to provide for them a special sleeping-basket, in which they may be placed at bedtime and carefully covered. A night's exposure to the comparatively mild winter temperature of the average home may very well prove fatal. Exercise is as important for these little creatures as for their larger cousins, and should be given at regular hours.

The dog should be bathed at frequent intervals, but should have every facility for rapid drying, particularly during cold weather. It is always best to confine the animal until it has thoroughly dried, as otherwise the work may be

undone, nothing pleasing a wet dog more than a chance to roll in dirt. Dogs with long or fine hair should be brushed regularly.

The matter of training is one of the greatest importance, a disobedient dog being second in unpleasantness only to a child who has been similarly neglected. The dog wishes to obey, and to please his master, but it is necessary to impress thoroughly on his mind just what is wanted. There is much difference of temperament among dogs, of course, but most individuals are more easily governed by a sharp word than by a blow. However, sentiment should not be allowed to interfere with discipline, and if the animal seems to require punishment, the corrective tap should not be withheld. Dogs are wonderfully keen in learning the meaning of gestures and even phrases, a faculty which adds much to their charm.

While dogs belong to a carnivorous family, they are now omnivorous in feeding habits. If given plenty of exercise, it is possible for them to keep in excellent condition on meat alone, but it is best to vary the constituents of the diet. This is particularly true of the smaller breeds. The food, then, should contain a certain percentage of meat, preferably cooked. It is important to see that this is free from small pieces or splinters of bone. To this may be added various vegetables, bread, cooked cereals and milk, in fact almost anything edible, provided it is clean and not too greasy. Dog biscuits solve the question to a very satisfactory extent, but the dog should not be compelled to eat them continually, without variation. Large bones should be given frequently, for gnawing keeps the animal out of mischief and provides various physical benefits. Over-feeding is the worst danger to which canine pets are subjected. No more than will keep the animal in good condition should ever be given, and sweets and starchy

foods should be withheld. Fresh, cool water, of course, should always be within reach.

The period of gestation in dogs is about sixty-three days. The prospective mother should have a box or corner, preferably in a darkened nook, where she will not be disturbed. The puppies' eyes are closed at birth and do not open till about the tenth day. When about four or five weeks old, the process of weaning may be commenced, by teaching the puppies to lap milk, an art which they soon acquire. This may be augmented with cereals, or bits of bread. Later puppy biscuits may be added and soon the diet includes everything given to the mother. The quantity of meat given to puppies, however, should always be restricted, until they are well grown, although they may have bones to gnaw on. When six or seven weeks old, they should be gradually removed from the mother.

Dogs are subject to few diseases, and when they do occur a veterinary should be consulted. In most instances, it is as useless for the amateur owner to attempt to treat a dog as it would be in the case of a child.

We cannot leave the subject, however, without some reference to rabies or hydrophobia, that dread and mysterious disease, to which dogs, in common with many other animals, are subject. Many persons have held that hydrophobia is an illusion, but its existence has been too well established to admit of further doubt. Hydrophobia in dogs appears in several forms, with varied symptoms. Sometimes the victim is extremely thirsty, while another will not touch water. The frothing mouth which to the popular mind is irrefutable evidence of rabies occurs also in epilepsy. Sudden changes in disposition, snappiness, manifestations of unfounded fear, in fact almost any unusual action, may be the first indication of the disease. A suspected subject should be isolated at once, where it can

be kept under control and the developments of symptoms watched. Many dogs are killed as a result of epileptic fits being wrongly diagnosed as rabies. A few hours of rest and quiet usually are the only requisites for recovery in the majority of such cases. Once the presence of rabies has been established, however, the dog should be destroyed at once.

Dogs frequently suffer from internal and external parasites, both of which are easily removed. Fleas are the most frequent cause of annoyance. A bath in which one of the many brands of antiseptic soap is used will quickly get rid of them. It is of the greatest importance to keep the dog's living quarters clean, for fleas breed in the filth of kennels.

Worms are frequently present and are a fertile cause of trouble. A bulging abdomen and emaciated frame are indications of the presence of parasites, but their passage with the fæces is the most certain evidence. Efficient vermifuges are obtainable from all dealers and one or two doses usually can be relied upon to rid the system of the intruders.

### Breeds

The attempt to enter fully into the points of the various modern breeds of dogs would be a task without the scope of this work. Moreover, literature on the subject is so rich that such description here is unnecessary. We may, however, briefly consider some of the types most suitable for pets.

There are few dogs which lack some particular use or purpose in their relation to man, and are not capable of ably performing their functions. But, since here we are considering pets, we must eliminate all the superb array of breeds specialized for hunting, coursing, flock-tending, and even guarding. Such dogs as the various hounds, the

Boston Terrier (above)
Airedale Terrier (below)

Great Danes, Mastiffs, Sheep-dogs and many others, while excellent in their own fields, may not properly be considered as suitable pets. It is among the smaller spaniels and terriers that we shall find house-dogs of dispositions and stature amenable to fondling, but often with courage to act efficiently in defense, if necessary.

Of the terriers proper, it is probable that the Fox Terrier is the best known, for it seems to be more widely distributed than any other small dog. Originally used in England for unearthing foxes, which had been driven to cover by the hounds, it still retains the courage and agility which are necessary for the work. The Fox Terrier is a hardy, active dog, small enough to be unobtrusive, but able under stress to give a very good account of itself.

The various rough-coated terriers of British origin are rapidly gaining in popularity on this side. The black-and-tan Airedale is the largest, the similarly marked Welsh Terrier is the smallest, and the sandy-red Irish Terrier is between the two. All of these dogs are of pleasing, upstanding outline, with the clean-cut heads of the terriers. They are notable for their courage and tenacity.

The Scotch Terrier is longer-haired than the preceding, and also differs in type, being prick-eared and grotesquely short-legged. This rough-and-ready little dog has recently enjoyed a wave of well-deserved popularity. Typical specimens are usually black or blackish in color. The West Highland White Terrier is really a white Scotch.

The Skye and Yorkshire Terriers, which represent the extreme of the rough-coated type, are not now so popular as was once the case. This may perhaps be due, in a measure, to dispositions not too sweet, but the over-development of the coat, with the attendant troubles in grooming, probably played its share. The two breeds are commonly confused, for each is clothed in long, silky hair. The Skye

Terrier, however, is as large as a small Cocker Spaniel, and generally dark gray in color, while the Yorkshire is a tiny creature, grayish-blue with tan markings.

The MALTESE TERRIER is one of the oldest of dog breeds, and is believed to have been the favorite lap-dog of the ancient Romans and Greeks. It is well known as a small animal with long, silky hair, of the purest white, but perhaps because of the care its coat requires it is not over popular.

The BULL TERRIER, too commonly known as a "bulldog," possesses such qualities as to endear it to the heart of any one who owns a responsive spark. No dog surpasses this magnificent animal in staunch courage and genuine unselfish affection. Ever ready to spring at the throat of the intruder, it is equally willing to submit itself to the maulings of children. It has one serious drawback, however, and that is its pugnacious instinct. Bred for years for the brutal purpose of pit fighting, the habit is almost impossible to eradicate. The old-fashioned dogs usually were brindle or pied, but the modern type is spotless white.

The BOSTON TERRIER is the only breed, with the possible exception of the Chesapeake Bay Dog, which has been originated in America. A result of crosses between the English Bulldog and the White English Terrier, it retains all of the good qualities of each ancestor, and few of the undesirable ones. It has the even, affectionate temper of the bulldog, without its awkwardness, and the active habits of the terrier, with but little of its pugnacity. Of comparatively recent origin, the Boston Terrier has made rapid strides from the chaotic state, and now breeds fairly true to type.

The ENGLISH BULLDOG, developed in the ancient sport of bull-baiting, has fallen on evil times. Now bred solely for exhibition purposes, this once hardy dog has become

monstrously exaggerated and weakened in stamina. These two facts are sufficient to account for its very evident decline in favor, for although repulsive in appearance, it is one of the most even-tempered and amiable of canines.

The FRENCH BULLDOG is often confused with the Boston Terrier, in the development of which it undoubtedly was concerned. They are easily distinguished, however, as the French breed has the undershot jaw and wrinkled face of the English Bulldog, points abhorred in the Boston Terrier.

The ENGLISH TOY SPANIELS probably are diminutive derivatives of the larger and more vigorous sporting spaniels. They are essentially lap-dogs and as such have been cultivated for centuries, their round heads, large eyes, and long, wavy hair being particularly appealing. Toy Spaniels occur in several colors; black-and-tan or King Charles; black, tan and white, tricolor or Prince Charles; ruby or red; and red and white or Blenheim.

The JAPANESE SPANIEL is similar to the English, but differs in various minor points, particularly in the shorter ears. It is perhaps more active and intelligent than the English breeds, and seems to be more popular. Japanese Spaniels generally are black and white in color.

The PEKINESE is evidently closely related to the Japanese Spaniel, but is usually solid in color, the most common being biscuit or fawn. Just now, this is perhaps the most fashionable of toy dogs. It came originally from Pekin, where it seems to have been the particular pet of the imperial court.

The POMERANIAN is the smallest of the wolf-type dogs and is evidently derived from that group. It is essentially a toy, and as such is very widely kept. The breed is hardier and more active than most small dogs of the spaniel type, but many specimens are characterized by a pronounced disagreeable odor.

## CHAPTER II

## CATS

THE position of the domestic cat is curiously anomalous. More universally the companion of man than any other creature, with the possible exception of the dog, it nevertheless remains consistently aloof and impatient of restraint. Amenable to caresses, even soliciting them, it still retains perfect independence, and tooth and claw are ever ready to resent the slightest infringement.

The origin of the domestic cat has been the source of much controversy. It seems most probable, however, that it is descended from one, or perhaps both, of two forms, which still exist in the wild state—the Egyptian Wild Cat (*Felis ocreata*) and the European Wild Cat (*F. sylvestris*). These two creatures are practically indistinguishable from domestic cats. Both are light gray in general, with narrow, vertical bars of a darker shade on the sides of the body, and horizontal bars on the upper parts of the four legs. The tail is banded, and there are markings about the face. There are minor differences in the markings and the European Wild Cat is slightly larger, less distinctly striped and more heavily furred than the southern species, otherwise they are similar. This form of marking is duplicated in the narrow-striped form of the modern tabby and undoubtedly represents the primitive type.

As is well known, mummified cats are commonly found in the tombs of the ancient Egyptians, and their taming at an early period is undoubted. It seems probable that these cats were introduced into Europe, where they interbred with the native form. The crossing of two species so similar

in appearance does not account for the divergence of color in domestic cats but this would follow naturally, as in most animals under the control of man. Long-haired or Persian cats, Manx, Siamese and other forms are simply variations of this old stock.

### General Care

Commonly kept as a check to the increase of rats and mice, the cat has tolerated man and rendered service in return for protection. Because of the detached and inscrutable habit of the animal, comparatively few become "companions of the fireside." Far too many are kept in the verge of reversion to their natural wild condition. City and country alike abound with half-wild creatures which yield but partial or even no allegiance to man and secure their food by foraging. Much of this unfortunate condition is attributable to irresponsible owners, who desert cats with unfeeling carelessness, or so underfeed them that their hunger is a menace to all small edible creatures. Cats of this type are the most formidable enemies of the remnant of our wild bird life, and the constantly increasing pressure of conservationists certainly will soon bring legal relief from the scourge. No feeling person would cast a cat upon its own resources and no public-spirited citizen will allow it to maintain itself by further depleting our valuable birds.

Properly cared for, the cat becomes quite a different animal. Although commonly considered inferior in intelligence to the dog, it is rather an unlikeness in temperament, the two creatures forming perfect antitheses. But the very impenetrability of the cat is a charm which attracts many persons, and certainly gives it a dignity which few animals attain. Well fed and kept within reasonable bounds, the cat can render full return to its owner, without infringing on the rights of others.

Cats are essentially carnivorous and it is natural that much of their food should consist of meat, either raw or cooked. It is not necessary that this be of the finest quality, but neither should it be of the vile sort sold by butchers as "cat meat." Fish makes an acceptable variation. Many sorts of vegetables and cereals, such as potatoes, rice, oatmeal, etc., are relished by most cats, particularly if mixed with meat broth or milk. Bread and milk is a staple and few cats refuse it. Milk, of course, is the proverbial beverage, but cats should never be kept without water. Kittens should be fed chiefly on milk and cereals, the amount of meat in the diet being increased with advancing age.

The cat is an uncommonly clean animal and easily trained to make use of a box filled with some fine, dry material, which should be changed frequently. Sand is much the best for this purpose, as ashes and sawdust are easily blown and tracked about. If a sleeping-box in a comfortable corner is provided, the animal will quickly realize that this is its allotted place.

The practice of turning the cat out of doors at night is as cruel as it is unnecessary. No animal is fonder of warmth and comfort, and the pet's happiness certainly is not increased by a night spent in cold and dampness. If as much energy were exhausted in keeping the cat indoors as too commonly is expended in putting her out, how great would be the boon to human nerves and unfortunate wild things! All felines are normally nocturnal and it is at night, if ever, that a curb on their activities is needed.

The device of hanging a bell on the neck, and that of arranging a wire, on which slips a ring with pussy's cord attached, will keep her out of mischief, especially during the spring, when young birds are about.

The period of gestation in the cat is nine weeks. The kittens' eyes are closed at birth but open about the tenth

*Photograph by H. V. Furness*

White Persian Cat

*Photograph by H. V. Furness*

Siamese Cat

day. At this period, bright light is dangerous and may result in blindness. Unless the kittens are of a valuable breed, or future homes have been arranged for them, all but one or two should be destroyed at birth. When four or five weeks old, the kittens will begin to seek their share of their mother's meals and soon will be quite independent.

Cats are sometimes troubled with fleas, but these are easily removed by sprinkling the fur thoroughly with pyrethrum or Persian insect powder, obtainable from any drug-store.

### Breeds

In spite of the great numbers of cats, very little has been done in the way of developing breeds, as compared with other domestic animals. The well-known promiscuity of the creature, coupled with the time-honored custom of giving the pet its liberty at night, doubtless accounts for this lack. It is only during the last half-century or so that distinct breeds have appeared.

The types of cats fall naturally into two chief groups: the short-haired and the long-haired or Persian. The former, of course, is simply the common cat, somewhat glorified by selective breeding. The body is rather short, strong and well filled out. The head is broad and round, with short, deep muzzle. The legs are of medium length and well muscled, while the tail must be tapering but not thin. The coat is short, soft and glossy.

The Persian or Angora Cat appears really to have originated in Persia, contrary to the usual rule of geographic names among domestic animals. There is no reason to suppose, however, that it originated in any other way than as a mutation or "sport" from the common short-haired variety, as in the Angora rabbit and Peruvian cavy.

Persian cats average larger than short-haired ones, and

the difference is enhanced by the great length of hair. This is soft, dense and very profuse all over the body, including a brush to rival that of the fox. The head is broad and short. The shoulders and back are well developed and the legs of moderate length.

Both short-haired and Persian cats are found in many colors. The eyes of most should be deep yellow or orange, with the exception of whites, in which they are blue, or sometimes one of each color. Blacks are perhaps the most common and must be of deep lustrous color, entirely free from white spots or ticks. Whites are attractive but all too frequently those with the correct blue eyes are deaf. In selecting specimens, this point should be observed.

Smokes have a rather unattractive sooty appearance, the coat being lighter underneath than on the surface, while the extremities approach black. In blues one finds the familiar Maltese. The particular shade may vary but it must be even throughout. Creams are an uncommon variety, of a soft, even shade suggested by the name. Chinchillas are perhaps the most beautiful of all, a soft, pale gray, with darker shadings. The eyes are generally green.

We come now to the tabbies and it is here that we are closest to the primitive. Although the narrow-striped type of the wild cat is still to be seen, it is not the one most in favor. The form admired by breeders is known as the marbled or blotched tabby. It is characterized by three parallel dark stripes along the back, from which radiate heavy oblique bands of varying width. The two types of markings are quite distinct. The origin of the blotched tabby is obscure but it seems most probable that it represents a mutation from the striped form.*

Tabby-marked cats occur in several combinations. The

* Pocock, R. I.: "English Domestic Cats," *Proceedings* of the Zoölogical Society of London, Vol. I., 1907, pp. 143-168.

silver tabby has a pale gray ground, with black markings, The brown tabby is similar but the main color is dark brown instead of gray. The red or orange tabby is pale yellow, with stripes of deep orange. It is a curious fact that the great majority of orange tabbies are males, females being very uncommon.

The tortoise-shell is a mixture of black, orange and yellow patches, which should be approximately equal in size and evenly placed. In this color, it is the males that are rare; in fact, so uncommon that the occasional individual is a curiosity. This is not a particularly pleasing variety, and becomes much more attractive when white markings are added.

The Siamese cat is a native of the country whose name it bears, and certainly is still bred there. It is smaller and more slender than the ordinary short-haired cat, and the tail is frequently kinked. The fur is noticeably short and soft, with a plush-like quality. The kittens are nearly white when born, but when they become adult assume a body color of pale grayish-fawn, with face, ears, legs and tail approaching black. The eyes are blue.

The Manx cat is characterized by the entire absence of a tail. This is a well-established character, which breeds true, and such cats are not to be confused with those in which the tail has been artificially docked. The hind legs of the Manx cat are considerably lengthened, giving the animal a curious, rabbit-like appearance.

## CHAPTER III

## DOMESTIC RABBITS *

It is not strange that the rabbit, as a pet, is almost ubiquitous. It has all of the qualifications necessary to endear it to the heart of childhood, and is large enough to be of interest to the practically inclined adult. In Europe, the rabbit is of much importance as a means of food supply. Dear experience, however, has shown that America has not yet reached the point where it can regard this creature in any other light than that of a pet.

The attempt made a few years ago, to popularize the Belgian Hare as a food animal, collapsed when the point of marketing the surplus was reached. The boomers had much to say concerning the great demand for the succulent flesh of the rabbit, but the only persons impressed were those who thought to court fortune by a short-cut. Tremendous prices were paid for breeding animals, but once all of the prospective breeders were supplied the Belgian Hare became practically unsalable.

The chief reason for this failure, of course, was the deeply rooted prejudice against eating rodents of any sort. It is a foolish antipathy, and once it has been overcome there is no doubt that the rabbit will become as popular as a table animal as its former promoters hoped.

When the Belgian Hare craze was at its height the most elaborate rabbitries were erected. Great buildings, fitted with hutches for the accommodation of thousands of animals, were frequently seen. Except in a few cases,

* Reprinted in part from *Country Life in America*. February, 1917. Courtesy Doubleday, Page & Co.

these structures are now devoted to other purposes, and the needs of the fancier are met by a much simpler affair.

### General Care

Rabbits do best when allowed plenty of fresh air. If properly protected from draught and dampness they are not affected by cold. Some few keepers of utility rabbits advocate the use of large outdoor runs, after the fashion of a warren. The success of such practice, however, is doubtful, and it certainly savors too much of the haphazard to commend itself to the careful breeder.

Individual hutches, if a size commensurate with the needs of the breed to be kept, will be found the most generally satisfactory. An unheated shed or stable, well ventilated, but free from draught and dampness, makes an excellent shelter for the hutches.

Many styles of cages are in use for housing rabbits. Almost anything will do, of course, so long as it gives the animals room to exercise and safely confines them. The boy who keeps a pair of rabbits in his yard is indeed lacking in ingenuity if he cannot devise, without specific directions, a suitable shelter for his pets.

But those who go in more seriously for rabbit-keeping must follow a well-established system. Most rabbitries favor the stock cage, which permits the keeping of a larger number of animals on a given amount of floor space.

Belgian Hares, because of their active habits, and Flemish Giants, because of their great size, require larger hutches than most other breeds. For these rabbits the hutch should be at least four feet long by two feet wide and high. Cages as short as two and a half feet wide will be found large enough for the smaller breeds, such as Dutch Rabbits.

The material to form the sides of the hutches must de-

pend on conditions. If the room is light and free from draught, the cage may be covered with half-inch mesh wire. On the other hand, if the position is exposed, all sides but one should be tightly boxed in.

Hutches for breeding does must contain a snug box in one corner, or at one side, where the family may have perfect privacy. This is formed conveniently by the use of a slide, running from front to back, as described for cavies. A door of solid wood should be placed at the front of the nest box, and another opening into the cage proper.

The floor of the hutch should at all times be well covered with clean sawdust. A handful or two of Sanitas will be found very efficient in keeping down the odor, although, fortunately, rabbits are not particularly offensive in this respect. The sawdust should be renewed at least two or three times weekly.

During cold weather, hay or straw may be strewn over the sawdust, as an added protection. Straw only should be used for Angoras, as hay mats the hair. If a nesting box is in use, this also may be furnished with hay or straw.

Hay, oats and greens are the staple food of rabbits. The hay should be soft, clean and free from mildew, that containing a large percentage of clover being the most relished. Carrots, beets, turnips and mangels are the vegetables most in favor, particularly during the winter months. When obtainable, lettuce, celery, cauliflower, dandelion, plantain, clover and fresh grass are much relished. Cabbage is always to be had, and rabbits eat it readily enough. However, it is a coarse food, and should be avoided when substitutes can be secured. There need be no fear of giving adult rabbits plenty of green food, when they are accustomed to having it. Animals which for some time have been deprived of this item may be attacked by colic if suddenly allowed to gorge themselves. Green foods should be neither

wet nor wilted, as either condition will cause dangerous digestive disturbances.

Many breeders make use of mashes containing bran, barley meal, middlings, oil meal, etc., and prepared meals may be purchased from dealers. Such mashes, if used, should always be thoroughly scalded and allowed to cool before feeding.

Two meals per day are sufficient for adult rabbits under ordinary circumstances. Fresh water should be in the hutches at all times, although rabbits are among the unfortunate animals which are popularly supposed to thrive best without it. It is true that when green food is abundant little water is consumed. But when the use of drier foods is necessitated water is indispensable, and it is therefore best kept in the hutches at all times.

Adult bucks and does usually are run in separate compartments, although non-breeding does may be kept together. No animal should be used for breeding until well matured, and at least six to eight months old. The usual precautions, of course, should be taken to select for reproduction only healthy individuals.

When a pair has been selected for breeding, the buck may be introduced to the doe's hutch, allowed to remain for a few hours and then removed. The period of gestation in rabbits is thirty days. During this period, the doe should be kept as quiet as possible and provided with plenty of nourishing food. Bread and milk should be given freely throughout the nursing period, and water should always be before the mother.

When the young are expected, the doe will arrange a nest in the box, and line and cover it with soft fur plucked from her own coat. The young are blind and nearly bare, so the breeder does not feel that it is a great tribulation to forego an inspection for the first few days.

At the end of this period the litter may be examined. It may be a very large one, perhaps as high as ten or twelve. But so many babies are too much for the mother to care for, and all but five or six should be removed. Of course the weakest individuals should be selected for destruction.

When three or four weeks old, the young rabbits will begin to appear outside the nest, and soon will be feeding freely. If weaned at four weeks, the youngsters are able to care for themselves, but if left until they are two months old, or even a little longer, it will prove better for both mother and offspring. When the young rabbits are three months old, the sexes should be separated. Just after weaning well-prepared mashes will be found of great use.

## Breeds

As the Belgian Hare is now by far the most popular breed, both in this country and in England, it may be considered first. It has, of course, no connection with any hare. It is a simple derivative of the common European rabbit (*Lepus cuniculus*), as are all of the other breeds so far as known. When first introduced from Belgium to England, it was confidently believed to be a cross between hare and rabbit, a fallacy founded, no doubt, on the close resemblance to the color of the former animal.

The Belgian Hare is essentially slim and racy. The head and body are long, the back slightly arched. The forelegs are very slender and of good length, the feet small and there should be no sign of a dewlap, or fleshy growth under the chin. The ears should be straight, carried upright and bordered near the tip with a narrow edge of black.

The desired shade of color is commonly described as "rich rufous red." The red is overcast with a plentiful

*Courtesy Doubleday, Page & Co.*

English Rabbit

*Courtesy Doubleday, Page & Co.*

Dutch Rabbit

Belgian Hare

*Photograph by E A. Quartes*

Lop-eared Rabbit

ticking of black hairs, which are desired to be of a wavy appearance, rather than evenly sprinkled.

Both black and white varieties of the Belgian Hare have been bred, but neither has ever become popular.

The Flemish Giant is the largest rabbit breed, and from this fact has threatened to rival the Belgian Hare as a market animal. However, it was not strong enough, numerically, to become widely popular during the rabbit craze, and since that time breeders have discovered that there are various small deficiencies to balance its advantage in weight. Its flesh is less delicate than that of the Belgian, it is somewhat less prolific and the young require a longer period to reach maturity. Nevertheless, the Flemish Giant is second only to the Belgian Hare in the numbers of its admirers.

The typical Giant is dark gray in color, wavily ticked with black. This ticking extends over the entire body with the exception of the under surface of the body, which is pure white. As in the Belgian Hare, black, white and also light gray varieties are acquired. The former, at least, has attained some favor, and now is rather extensively bred.

In shape it is to the Belgian Hare as the draught horse is to the thoroughbred. Its body is heavy, its legs thick and strong. The head is rounded and full, and the dewlap is well developed.

A well-grown Flemish Giant should weigh eleven or twelve pounds. Occasional specimens are seen which scale up to sixteen or even eighteen pounds.

To the color breeder, silvers are perhaps the most attractive of rabbits. There are three varieties—Silver Gray, Silver Brown and Silver Fawn—each presenting a complicated and delicate color scheme. The Silvers are small, cobby rabbits, seldom exceeding five or six pounds in weight. The ears are small and narrow, and the coat short and crisp.

The Silver Gray is really a bluish-black rabbit, evenly ticked throughout with white hairs. The wavy ticking so much sought for by breeders of Belgian Hares and Flemish Giants is anathema in a Silver. Young Silver Grays are black in the first coat, the silvering appearing later on.

The Silver Fawn has the ground color orange, with white hairs evenly dispersed throughout. This is a really beautiful animal and well worth cultivation.

The Silver Brown, said to be the result of a Silver Fawn-Belgian Hare cross, is rather more complicated. The body shade is chestnut which, when blown up, discloses a bluish undercolor. Over this chestnut ground both black and white hairs are evenly scattered, producing both silvering and ticking. The Silver Brown is difficult to breed to perfection, and is perhaps less handsome than its congeners.

Black-and-Tan and Blue-and-Tan Rabbits are of the same ground shape as the Silvers, with cobby bodies, neat ears and short coats. In size they are even smaller, seldom exceeding three or four pounds weight.

The ground color is blue or black according to the variety. In either case the tan markings are the same. It is most interesting to note that the distribution of tan is much the same in dogs, mice and rabbits. In the latter species there is a triangle at the base of the neck, and the underparts, chest and throat are solid tan. There is a ring around each eye, a line along the jaw, a touch on the nostrils and edgings on the ears. The front feet are tanned on the toes only, but the hind feet have this color on the inside as well.

The Polish is the smallest of rabbit breeds. In body it is short and cobby, with small, narrow ears. The eyes are large and prominent. The coat is very short and smooth, requiring much grooming to keep it in condition.

As bred in America and in England, the Polish Rabbit is

invariably white. A few years ago, however, near Brussels, the writer saw some excellent specimens of the breed of the deepest black. This color seems unknown among English-speaking breeders.

The Lop-eared Rabbit is one of the oldest breeds. As with many other domestic animals, the over-development of an abnormal character has caused its final downfall. Once by far the most popular of all rabbits, its devotees now are many times outnumbered by the followers of more normal breeds.

Ears are everything with the Lop-ear, other characters being of small importance. It is a large rabbit, as indeed it must be to carry the immense aural appendages. It occurs in a great variety of self and pied colors, little attention being given this point.

The ears are perfectly pendent, any tendency to uprightness being an unforgivable fault. An almost unbelievable length has been produced and rabbits with ears measuring twenty-seven inches long by seven inches broad have been bred.

Lop-ears require heated quarters for the best results. This fact, combined with the constant handling and manipulation required to produce the finest specimens, have served to discourage the tyro.

Broken-colored rabbits are found in three well-known breeds, the most popular of which is the Dutch-marked. This animal presents the usual Dutch-markings, which consist of colored patches including cheeks, ears and eyes and saddle of the same shade, extending backward from the shoulders. The greatest importance is attached to evenness of marking, particularly in the face patches, and the hind feet, which are white.

There is a great variety of colors, black, blue, gray and tortoise-shell or shaded fawn being the most popular.

Dutch-marked Rabbits are small and short in body, with fine, straight ears and short coats. They are prolific and easily reared, and reputed to be the gentlest of the rabbit breeds.

The Himalayan Rabbit is an excellent example of the tendency of fanciers to give to breeds of doubtful origin names indicating importation from distant countries. The Himalayan Rabbit was produced in England, an interesting account of its appearance being furnished by Darwin.*

This is an albinistic breed, the eyes being pink. It is mainly white, with nose, ears, feet and tail of a deep black. The nose mark should be well developed, and cover the jaw, as well as the face as far as the eyes, while the legs should be colored well past the first joint. Much difficulty is experienced in getting the black sufficiently dense, most specimens being inclined to sootiness. Himalayas are white at first, and require several months to attain the full markings.

The English, sometimes known as the Butterfly Rabbit, is a most bizarre creature. It seems without the bounds of possibility that any animal could be bred even to approximate the markings demanded, yet well-nigh perfect specimens are seen.

The English is a rather large rabbit, averaging up to eight pounds in weight. It is white in general, with curiously distributed colored markings. The tail, ears, a ring about each eye, a circular spot at each side of the nose, supposed to represent the wings of a butterfly, and a line down the middle of the back are colored—black, fawn, blue, etc., as the case may be. The remainder of the markings consist of small, circular spots, placed as follows: a row along the sides, each spot to be well separated from the others; a

* *Animals and Plants Under Domestication* (Westminster Edition), Vol. I, p. 109.

spot at the first joint of each leg; three along each side of the belly, and one in the center of each cheek. It is important that the markings be clear, distinct and pure in color.

The Angora is the most difficult of rabbits to keep in good condition. Its fur, while not so long, in proportion to its size, as that of the cavy, is much finer than that of the latter animal. It is very prone to matting, and only the most constant and careful brushing will keep the animal in presentable condition.

Angoras are typically white, but colored varieties have been produced and are growing in popularity. There is no reason why the breed should be limited to white alone, and no doubt colored animals will, in time, become as well known as the albinos.

Because of their soft, almost woolly fur, Angoras should not be bedded with hay, straw being much more desirable. Plenty of hutch space and absolute cleanliness are essential to the welfare of these rabbits.

## CHAPTER IV

## SMALL WILD ANIMALS

Except for the domesticated forms, mammals are not especially popular as pets in this country. In England, on the other hand, interest in these creatures has spread to such an extent that the Amateur Menagerie Club, devoted to furthering the interests of this particular branch of pet-keeping, has recently been organized. The reasons for this difference in the public attitude are not easily set forth; but the fact remains that, with the exception of the commoner monkeys and a few others, small exotic mammals suitable for the amateur are not at all freely imported here. Such as do come are in demand among zoölogical gardens, and seldom are obtainable by private persons.

Many of our own native animals, however, make engaging pets, and there is no great difficulty in securing specimens. It is generally best to obtain young creatures, which, if reared by hand, soon forget their native timidity and become perfectly tame. Even if very young, most mammals are easily reared on the bottle, if reasonable attention be given them.

Mammals are more easily fed than birds, and since they are less active, generally are happy in comparatively small quarters. On the other hand, their cages must be strongly built, and are not so readily kept clean as are those of birds. No creature should be confined in a cage too small to allow it sufficient exercise. Most of our native species are quite hardy, and out-of-door cages, with suitable shelters, should be provided for them.

### Monkeys

Monkeys are practically the only small foreign animals which reach our market in any numbers. Specimens of the commoner sorts are always obtainable, but tame individuals, suitable for pets, are not abundant. Young, hand-reared monkeys are interesting and diverting creatures, but as they grow older are very likely to become bad-tempered. Adult males often are vicious, and are then very dangerous. The writer well remembers a large male Geoffrey Spider Monkey which was given him when collecting in Costa Rica. This animal had been a family pet for several years, but recently had become so ill-tempered that only the cook dared go near him. A suitable box having been prepared for his reception, his keeper was directed to lead him to our headquarters. A series of shrieks heralded the coming of the "pet," dragging on his chain, at the head of a procession of curious natives. Getting him into the box was a problem, for no one dared handle him and he threw off our light net with the greatest ease. He was finally drawn into the cage by running the free end of his chain through a hole drilled in the back. Once inside, he became perfectly quiet, and is still living in perfect contentment in the New York Zoölogical Park.

Most species of monkeys are natives of warm climates, and cannot endure low temperatures. It is therefore necessary to provide heated quarters, at least during cold weather. If the animal is to be confined continually, the cage should be not less than four feet in each dimension, and, if possible, should connect with an outside run for summer use. If plenty of light can be obtained, it is best to make the walls of the cage entirely tight, with only the front wired, thus preventing draughts, which are fatal to monkeys. The wire and cage structure must be strong, for even small ani-

mals will test it severely at times. If the monkey is particularly tame, so that it may frequently be allowed its liberty, either under the supervision of its owner or controlled by a light collar and chain, its cage need not be so large.

Some individuals like a sleeping-box, placed near the top of the cage. Strong branches and swings may be adjusted according to conditions. The floor should be covered with sawdust and a bunch of hay or straw placed in one corner for a bed.

When first received, monkeys are not infrequently troubled with various external parasites. They may be freed from these by a bath in water containing creolin or some similar substance, after which they must be thoroughly dried. Insect powder sprinkled in the hair is also a good remedy.

While the diet of monkeys in the wild state varies somewhat, according to species, most are omnivorous in captivity. Vegetables, raw or cooked, boiled rice, ripe fruit—such as bananas, oranges, sweet apples, etc.—stale bread and an occasional bit of well-cooked chicken will meet the needs of all. The food should be as varied as possible, and given two or three times daily. Over-feeding is to be avoided here, as in other groups. Most monkeys will drink fresh milk, to which a raw egg may be added now and then. Clean water should be provided at all times.

The monkey which is most abundant in the American market is the RHESUS (*Pithecus rhesus*). This species belongs to the family LASIOPYGINÆ, which, according to Elliot,* includes all of the Old World monkeys, with the exception of the great man-like forms. It is the commonest monkey of India, ranging from the hot plains to a comparatively high elevation in the Himalayan foothills. It is

* Elliot, D. G.: *A Review of the Primates*. 1912, Vol. II, p. 213.

Rhesus Monkey

White-faced Sapajou Monkey

Opossum

a rather large animal, light brown in color and with a comparatively short tail. The males, which are very likely to to become fierce as they mature, are larger than the females. This is a hardy species, easily kept.

Of the New World monkeys, most of which are characterized by the long, prehensile tail, the Capuchins or Sapajous are the most common in captivity. They belong to the family CEBIDÆ, which includes all of the larger monkeys of the Western Hemisphere. The Capuchins are active and easily kept, tame individuals being affectionate and amusing. Monkeys of this genus are seen more frequently than any others, in the possession of organ-grinders. One of the best known species is the WHITE-THROATED CAPUCHIN, or "RINGTAIL" (*Cebus hypoleucus*). It is somewhat larger than a cat, its head and throat being nearly white, the remainder grayish brown.

The Marmosets, which form the family CALLITRICHIDÆ, are found only in tropical America. There are a large number of species, all characterized by their diminutive size and squirrel-like habits. Marmosets make attractive pets, but generally do not live long in captivity. It is essential that they be kept warm and dry, as such conditions are necessary if they are to remain in health. Ripe fruit, bread and milk, biscuits, vegetables, insects and an occasional young sparrow are the usual items of diet. The most freely imported species is the COMMON MARMOSET (*Callithrix jacchus*), of Brazil. It is a tiny creature, light brown above and blackish below. The head is black, with long, white ear-tufts, while the tail is banded with black and white.

### The Opossum

The VIRGINIA OPOSSUM (*Didelphis virginiana*) belongs to the order MARSUPIALIA, the members of which are char-

acterized by the fact that the young are born at an incompletely developed stage and finish their early growth in a sac on the abdomen of the mother. When they finally emerge, the young opossums clamber to their mother's back, holding themselves in position by wrapping their prehensile tails firmly around that of the parent. Opossums are typically tropical animals, South and Central America being the home of a large number of species of very diverse size. There is but one species in the United States, generally confined to the south, but not uncommon in the vicinity of New York.

The opossum is a hardy creature and lives well in captivity. It cannot be considered as a particularly desirable pet, since it is nocturnal in habits and lacks intelligence and friendliness of many other mammals. Its cage should include a sleeping-box and suitable branches for climbing, at which it is very expert. The opossum's jaws are powerful and it can administer a severe bite. It is an omnivorous feeder, and will eat meat (which should be partly cooked), chicken heads, sparrows, pigeons, bread and bananas and berries. The diet which seems to suit it best is milk and raw eggs, with a little chopped meat added.

### Foxes

The recent craze for breeding foxes for their fur has brought great popularity to the keeping of these animals in captivity. The fox breeders of Prince Edward Island have learned much concerning the needs of these animals, and have developed a great deal of skill in handling them.

As a pet the fox does not shine. He is both smelly and tricky, really tame individuals being most uncommon. On the other hand, in a suitable enclosure, he lives well, and under proper conditions will breed.

A fox run should be of size sufficient to give the animal plenty of space, and not merely a box with a wire front. The wire must be strong and small in mesh. It must be sunk in the ground to prevent digging under, and have an overhang so that the occupant cannot climb over. A shelter of some sort should be included. If it is found necessary to confine the fox in small quarters, the cage must be cleaned frequently or it will become unbearable.

Foxes are chiefly carnivorous, of course, and meat, preferably partly cooked, should form the chief article of diet. Small animals and birds, vegetables and bread, complete the menu.

The foxes belong to the family CANIDÆ, of the order CARNIVORES, or meat-eaters. A great many species are found in various parts of the world, but only two are known in eastern North America.

The most common species of the East is the RED FOX (*Vulpes fulvus*). The typical specimen is reddish-yellow, the tip of the tail and the underparts being white and the ears and feet marked with black. The Cross, Black and Silver Foxes are simply melanistic phases of the common form, and not, as commonly supposed, distinct species.

### The Raccoon

Of North American mammals the raccoon is one of the most suitable for a pet. Wild-caught specimens are difficult to tame, and are hardly worth while. But if taken while very young and carefully reared, the raccoon remains as gentle as a kitten. It is best confined by means of a collar and light chain, and should be kept well away from poultry, for which it has an insatiable appetite. If it is found necessary to confine the creature, the cage should be as large as possible and strongly constructed. If an out-

door run is planned, the wire should be sunk in the ground, either carried entirely over the top or an overhang arranged. If a dead tree or branch can be included, the captive will spend much of the daylight hours curled up in sleep among the limbs.

The raccoon in captivity eats meat, fish, bread and various vegetables, which should not be excessive in quantity. Plenty of clean water should always be available, for the creature has a curious habit of washing all of its food before eating.

The Raccoon (*Procyon lotor*) belongs to the family Procyonidæ, and is closely allied to the bears. The hind feet are of the type known as plantigrade, since the entire foot, and not merely the toes, is used in walking, as in the bears. The typical species ranges over the eastern United States, as far west as Arizona and Montana.

### The Skunk

Like the fox, the skunk is now being bred in some numbers for its fur. The experimental stage, however, has still to be passed, and skunk farmers do not appear to have obtained the success of fox breeders. Although generally held in bad repute because of the undoubted efficiency of the liquid musk secreted by glands near the tail, the skunk nevertheless makes an interesting pet. Young individuals become very tame and docile, and seldom make use of their natural defense. It is always safest, however, to render the apparatus innocuous by cutting the ducts of the glands, thus making their discharge impossible.

Skunks are not great climbers, but are powerful diggers; so if they are kept in an open enclosure, the fence must be run well into the ground, with an inward turn at the bottom. The wire must be strong and the mesh small. The

Red Fox

Woodchuck

*Photograph by E. R. Sanborn* *Courtesy New York Zoological Society*

Albino Gray Squirrel

skunk naturally sleeps in an underground burrow, and if a barrel, with a wooden shute attached, be sunk in the ground, it will take advantage of the retreat. Skunks are chiefly insectivorous, but in captivity will eat meat of all sorts, birds and small animals, frogs, fish, cereals, dog biscuit and various fruits and vegetables.

The skunks belong to the family MUSTELIDÆ, which includes the weasels, mink, wolverine, etc. Numerous species and subspecies are distributed throughout North and Central America. The form found in the northeastern United States is the COMMON SKUNK (*Mephitis mephitis putida*). There is much variability in the relation between black and white in the fur, those with full white dorsal stripes being of much less commercial value than those which are almost entirely black. There is no doubt of the possibility of establishing, by selection and careful breeding, a strain of skunks with the markings much reduced.

### The Woodchuck

Although the woodchuck is one of our commonest mammals, it is seldom kept as a pet. The reason for this neglect is obscure, for, if caught when young, it has many endearing qualities. Adults when first captured are wild and vicious, and since they can bite severely, are not suited for pets.

If the woodchuck is tame enough to be allowed its freedom at least part of the time, its cage need not be of large size. It is generally best, however, to arrange an outdoor run, in which the animal can live in comfort. It will be necessary either to cover the top or arrange an overhang and to run the wire well into the ground, with an inward twist at the bottom. A barrel should be sunk, with a drain pipe or wooden runway, to serve as a nest. Hay or other material

should be furnished for lining. During the winter months, the woodchuck will hibernate in its underground chamber, emerging quite unconcernedly in the spring. Woodchucks are vegetable feeders, and will thrive on a diet of fresh grass, clover, cabbage, lettuce, vegetables of all sorts and dry bread. Very young specimens may be fed at first on milk and boiled cereal.

The Woodchuck (*Marmota monax*) belongs to the Marmot family (Sciuridæ), of the order of Rodents or Gnawers. It is found throughout the eastern United States as far west as Kansas, and is represented in other portions of the continent by various allied forms. Cases of melanism are not rare, and pure albinos are occasionally seen.

### Squirrels

Squirrels are kept as pets more frequently than any other of our mammals, the combination of attractiveness and propinquity no doubt accounting for their popularity. Gray Squirrels, even when caught adult, sometimes become tame, but Red Squirrels and Chipmunks practically never do. With all species, it is much better to secure them when very young. Baby squirrels are not at all difficult to rear, and will take milk from a bottle with little urging.

The usual wire cages, with wheels attached, are quite unsuited for such active creatures, giving them insufficient room for exercise. A much better plan is to build a large outdoor cage, similar to an aviary, of wire not more than half-inch mesh. This can be fitted up with branches and nesting logs, and will make an ideal home for a pair of squirrels. Gray and Flying Squirrels frequently breed in captivity, but Red Squirrels do so less often.

Squirrels are chiefly vegetarian, but often stray from the narrow path, and indulge in eggs and young birds. In

captivity the diet should consist of grain, nuts, vegetables, dry bread and an occasional bone with a little meat attached, or a raw egg.

Before attempting to keep squirrels, one should become thoroughly familiar with the local game laws, since certain species are protected in many states.

The squirrels belong to the same family (SCIURIDÆ) as the woodchuck. A great many species are known, but only three are common in captivity. The one most frequently kept as a pet is the GRAY SQUIRREL (*Sciurus carolinensis*), which ranges throughout eastern North America, from southern Canada to Florida. The typical form is gray above and white or brownish below. Black specimens are common in many parts of the country, and pure white ones are sometimes seen. These are simply melanistic and albinistic phases, of course, and not distinct species.

The RED SQUIRREL (*Sciurus hudsonicus*), divided into numerous subspecies, inhabits most of the northern part of North America. It is the smallest of the true squirrels and always recognizable by its reddish upper parts and white breast. Young Red Squirrels make excellent pets and will retain their attractive ways when they become adult. Older specimens, however, seldom if ever lose their wildness, and are better let alone. The diet of the Red Squirrel should contain more animal food than that of most other species.

The NORTHERN FLYING SQUIRREL (*Sciurus subrinus*) is found, in some of its races, through northern North America. In the southern states two other distinct species occur, but all are essentially Flying Squirrels. Of all the squirrels, these are by far the most attractive, their soft fur, large, dark eyes and gentle manner setting them apart from the others. Their only drawback, however, is the fact that they are nocturnal in habit, spending most of the

daylight hours curled up asleep in their nests. At night they are very active, scrambling about the cage like mice. Perhaps, more than with other squirrels, it is very necessary to provide a hollow log or other cavity for its nest. It is not unusual for the Flying Squirrel to breed in captivity and to rear its young successfully. This animal does not really fly, of course, but makes prodigious leaps, volplaning to safety by spreading the large flaps of skin which join the limbs on each side of the body.

The Eastern Chipmunk (*Tamias striatus*), divided into several subspecies, is found in the eastern United States and southern Canada. It is essentially a ground-dweller and generally ascends trees only when hard pressed by an enemy. If exposed to cold during the winter, this species immediately begins hibernation, from which it does not emerge until the approach of spring. If kept in a heated room, however, it remains active throughout the year. Baby chipmunks make engaging pets, but if caught adult they seldom overcome their natural timidity. Throughout the western states there are a great number of species of chipmunks, many more beautiful than our eastern species, and just as desirable as pets.

### Wild Rabbits and Hares

For some reason, most wild rabbits do not thrive in close confinement. Whether this is due to improper feeding or to some other cause is unknown. On the other hand, occasional individuals thrive exceedingly, so there is reason to believe that further investigation will bring better results.

The wild rabbit or hare should be given as much space as possible, preferably out of doors. They do not climb, but dogs and cats are likely to enter, so it is safer to cover the entire top with wire netting. Hares do not burrow, so

are not likely to escape in that manner, but for rabbits it is necessary to run the wire into the ground, or even cover the entire bottom of the cage. Our native species are indifferent to cold, but cannot endure damp quarters. Hares do not nest in holes, and so should be supplied with a shelter on the surface. Rabbits dwell in burrows, and a box or barrel may be sunk for them. The food should be of a vegetable nature, such as fresh grass, clover, cabbage, vegetables and bread. Water should be provided at all times.

The rabbits and hares belong to the family LEPORIDÆ, of the same order as the woodchuck and the squirrel (GLIRES). The two groups are distinguished by the fact that hares have long ears and spend their lives above ground, while rabbits have short ears and make their homes in burrows.

The VARYING HARE or SNOWSHOE RABBIT (*Lepus americanicus*), of the extreme northeastern United States and Canada, is a typical hare, well known to the sportsman for its excellent running qualities. This hare is brown during the summer months, but at the aproach of winter assumes a white coat, presumably for protective reasons. Captivity does not seem to suit it, although there appears to be no good reason why it should not live.

The JACK RABBIT (*Lepus texianus*) is, of course, really a hare, and not a rabbit. Several closely allied species are found in various parts of western North America. The Jack Rabbit is characterized by a slim body and immense ears. If given proper treatment, this species does well in captivity, but some individuals appear to be less hardy than others.

The COTTON-TAIL or GRAY RABBIT (*Lepus sylvaticus*) is a true rabbit, nesting in burrows. It ranges from the northern portion of the United States to Central America. The Cotton-tail is readily distinguished by its small size,

short ears and white fluffy tail. Under suitable conditions, it does well in confinement and can be kept with little difficulty. No wild rabbit, however, even approximates the hardiness of domesticated forms, and if a pet is all that is desired, the latter certainly should be chosen.

# SECTION II

# BIRDS

## CHAPTER V

## GENERAL CARE

Most mammals, with the exception of the smaller sorts, are cultivated because of their economic value. Birds, on the other hand, usually are kept for their æsthetic worth alone. It is true, of course, that the various domestic fowls form an important source of our food supply, but, aside from them, there is little reason for keeping birds but for the pleasure they bring. The song of the canary insures its constant existence in thousands of homes the world over; the imitative ability and quaint habits of the parrot make certain its continued popularity. Those birds which cannot divert us with their songs invariably possess decorative value, since all birds are beautiful.

Birds in general are clean, free from offensive odors, gentle and easily housed. Properly cared for, most species will live in captivity for many years. The adverse conditions under which canaries frequently are kept, and their usually thriving appearance, attest the hardiness of the bird when its needs are even partially understood. The canary, to be sure, has been cage-bred for generations, and its requirements are of the simplest, but the great majority of wild birds become equally happy in captivity when their wants are fully grasped.

There is some feeling among persons of supersensitive or sentimental temperament against the caging of wild birds. That it is wrong for certain of the most delicate species to be kept by the indiscriminating there can be no doubt. Some birds require care which every one has not

the knowledge or ability to provide, and under such circumstances bird-keeping is not to be encouraged.

But to maintain that every caged bird is unhappy is a contention which cannot be supported. The brain of a bird is not developed to the point which has been reached by the higher mammals. Even they become perfectly contented in captivity when properly housed, so why should not the bird? There are no grounds for believing that the avian mind is concerned with matters other than those of its daily existence. No one who has had personal experience with properly fed, correctly caged wild birds can doubt their contentment. Relieved from the problems of securing daily food, freed from the ever-present dangers which throng their feral lives, their lot certainly is not that of the oppressed.

Such results, however, are dependent on the bird-keeper himself. No person should take upon himself the responsibility of caring for any living creature, unless he is thoroughly familiar with the conditions which are necessary for its well-being. This rule applies to the keeping of horses and dogs, as well as to that of the most delicate birds, and its infractions are even more likely to be found in the first field than in the latter.

Because of the alarming decrease in numbers of native American birds, laws prohibiting their capture became necessary. There can be no question of the justice of these restrictions, but to their passage must be attributed the lack of interest in avicultural matters, general in this country. The English, notable for their love of pets and the thoroughness with which they pursue their hobby, support two societies and three periodicals exclusively devoted to the study of wild birds in captivity. A great volume of facts concerning nesting and other habits of birds has become known through the efforts of these enthusiasts, not to

mention the wonderful advances made in the technic of bird-keeping.

This sort of thing is almost unknown and but little understood in America. The great field of scientific research and the simpler pleasures afforded by the companionship of birds are rendered inaccessible and difficult by lack of knowledge. That such conditions may not always exist is the earnest hope of the writer.

Through extension of knowledge of practical bird-keeping, many species threatened with extinction may be saved. One very notable instance is that of the Wood Duck. This bird has long been known in Europe as an ornamental addition to lakes and ponds. It is now bred in large numbers in Holland and Germany, and three-quarters of the captive Wood Ducks seen in America were reared in Europe. This is now one of the rarest of our native ducks, but propagation of captive birds will save it from extinction.

Work of this sort is now beginning to be done extensively in America, though principally with game birds. Systematic attempts are being made to save the Ruffed Grouse and the Bobwhite. In the New York Zoölogical Park, Mourning Doves are now being reared in considerable numbers, and liberation of surplus birds has already taken place.

In the following pages none but the commoner of the many species of cage birds is considered. Only those sorts which are readily obtainable in America, and which are hardy and easily kept in captivity, are mentioned. Space does not permit the detail necessary to fully describe the care of more unusual forms. Moreover, the keeping of the rarer birds, most of which are uncommon in captivity simply because they are difficult to cater to, should never be undertaken except by persons made competent by experience.

Few North American birds, for obvious reasons, are included. Every one should thoroughly familiarize himself with the bird laws of his own state, and regard them religiously. In cases where state permits have been granted for the carrying on of special work with native species their care may easily be deduced from that described for closely related foreign forms.

### Cages and Aviaries

Two methods of housing birds, the aviary and the individual cage, are in general use. The former is usually chosen by those who go in for collections, but the smaller cage is necessary for special cases, and is of course most commonly used by persons who keep only a bird or two.

In the aviary birds may be expected to live and breed as well. Conditions may be made to approximate very closely those under which the bird lives in the wild state, and a really well-planned aviary leaves little to be desired as a bird home.

The aviary may be of any dimensions, from the larger buildings and flying-cages which house large collections to single enclosures of wire netting. There are in America a growing number of private collections, some of which are magnificently housed. In such cases, the bird house should be well built of wood, brick or concrete, with the light supplied from ample skylights. These should be made to rise, thus furnishing the ventilation needed in hot weather. Ample walking space should be left for the attendant and for visitors, and the remainder divided into as many large flight-cages as permissible. These cages should be fitted with numerous branches, to serve as perches and hiding-places, and a few nest boxes as well, although much breeding seldom is done under such conditions. If

delicate birds are to be kept, provision must be made for artificial heat.

Each cage must, of course, have arrangements for food and water. The former may be supplied in small dishes, which are removed and thoroughly cleaned daily. Many of the larger houses have a system of running water in each cage; but if this is not convenient, any shallow receptacle, sufficiently wide and preferably of enamel or agateware, will answer.

For the bottom of the cage sand is the best covering.

Each indoor cage should connect with an outdoor flight, the dimensions of which may be as liberal as space will allow. If the installation is of a permanent character, concrete bases and angle iron are the most lasting. Otherwise wooden posts, covered with one of the many preservative fluids now on the market, will last for years. For the smaller birds all wire used should be of half-inch mesh. There are many types—diamond, hexagonal and square—the first-mentioned being the most desirable so far as shape of mesh is concerned. Larger birds, of course, are easily confined with wire of larger mesh, but rats, half grown, can easily pass through a space one inch square. It is much better, therefore, to use the finer netting throughout, and exclude rats as well as sparrows. Nothing larger than three-eighths inch will keep out mice, and these pests are the ever-present bane of the bird-keeper. Wire or concrete should be run well into the ground, to prevent rats and other marauders from digging under. If concrete bases are used, they should be run up for at least a foot above the ground. Otherwise, boarding should cover the lower part of the outer walls, at least to prevent dogs and other intruders from alarming the inmates.

The flights should contain as much natural vegetation as possible, and more may be added as occasion requires. The

ground should be well sodded, and it may be well to make gravel zones along the walls, to prevent the formation of unsightly bare spaces.

Evergreens, mountain laurels and rhododendrons make excellent cover. Privet and similar shrubs are hardy and grow well, while the many species of Spiræa add a touch of color early in the spring. Pampas grass, if there is room for it, is wonderfully decorative, and affords the best of shelter.

For aviculture on a smaller scale, aviaries of almost any sort, so long as they are properly constructed, will do. Many birds are sufficiently hardy to winter out of doors without heat. It is always best, however, to attach to each flight a shelter of some sort, into which the birds may be driven in case of cold weather. Many bird-keepers make use of such cages during the summer months only, and remove their pets to warmer quarters during the winter.

Aviaries of the sorts described are suitable for birds of many kinds, including all of the small perching birds, parrakeets, doves, quail, etc. The selection of cage-mates is a matter for careful consideration. If the aviaries are large, many species which will not agree in small quarters will live in happiness. Most of the smaller birds may be associated with safety, but many of the weavers are quarrelsome and not to be trusted with weaker species. When it comes to the larger forms, it is always best to be certain of the characteristics of the species and the temper of the individual before introducing it to mixed groups. Birds which are so quarrelsome or delicate that they are best kept alone will be noted in the following pages.

If breeding is especially desired, seclusion is the keynote. The safest way is to let each pair have a separate aviary to itself. As this is often difficult, several pairs of different species may be kept together, if the flight is large enough to

furnish plenty of space for each. Plenty of thick cover should afford snuggeries for timid birds, and nest boxes should be hung about in likely positions. Nesting material, such as soft hay, horse hair, moss, leaves, feathers, etc., should be available. String and cotton are dangerous for such purposes, as the feet of parents or young may become entangled.

When birds are expected to breed, the aviary should be entered as little as possible, and then by one person only. Dogs and cats must be prevented from alarming the inmates of the aviary, as a fright at this time may upset breeding plans for the season.

Cages are the usual homes of pet birds, space and conditions making their use necessary in most cases. While many birds undoubtedly do better at liberty in aviaries, it is equally true that a good number are much better off in smaller quarters. There are species whose food habits make them difficult to cater to, or which are uncommonly delicate as regards draught and dampness.

There are all kinds of cages, and the selection of a suitable one is not the simple matter it is commonly supposed to be. The open brass cages commonly sold are an abomination from many points of view. They offer the inmate no protection from draught and fright, the brass is likely to become coated with poisonous verdigris, and artistically they are outrageous. It is unfortunate that the brass cage has become so popular in America, for it will be displaced with difficulty.

Handsome wicker cages are now being offered by some of the more advanced shops, but the prices asked generally are excessive. While these cages are dangerously open, they excel the brass contraption in at least two points.

The ideal bird-cage is of the box type. Such a cage is entirely enclosed, except on one side, which is furnished with

wire bars. It may be handsomely enameled and delicately ornamented, or it may be the more plainly finished but serviceable sort known as a breeding-cage. The better grades of box-cages are difficult to obtain in America, although in Europe they are in common use. But the breeding-cage is ubiquitous, and is to be recommended when a more decorative one is not available.

The box-cage is almost essential for the well-being of small cage birds, few but the canary becoming so inured to cage life that they can endure the open type. Delicate specimens are protected from the dangers of draughts, and troublesome nightly covering with a cloth is avoided. Two feet long by fifteen inches deep and high are the usual dimensions of the breeding-cage. It is roomy enough for one bird of fairly large size, such as a thrush, for a pair of canaries or similar birds, or for a mixed group of a half dozen or so small finches. Overcrowding is fatal and a frequent mistake with beginners.

The perches should be small enough for the bird to grasp easily, and so placed as to allow room for flight. Excellent perches may be made of natural twigs, with the bark left on. These afford a grip for the bird's feet and may save many a case of foot trouble.

Sand is the proper covering for the cage bottom. White, clean sea-sand is the best sort. Shells and gravel are likely to injure the feet, and the common brown sand contains much clay, which soon dries and becomes pulverized to dust. This sand should be changed or at least brushed over daily, as it is important that the bottom of the cage be dry and clean.

### Foods

According to the food they eat, the smaller cage birds are divided by aviculturists into two large groups—"soft-

bills" and "hard-bills." Soft-bills are those of insectivorous or frugivorous habits, while hard-bills are the seed-eaters.

The latter division includes the great tribe of finches, grosbeaks and buntings, the weavers, waxbills and grass finches and a few others. The feeding of these birds is of the simplest order. Canary seed is the chief item, with white and yellow millet of nearly equal importance. The former is eaten by every seed-eating bird and is the most valuable of foods, although it has a tendency to induce fatness. Millet is better adapted for the small waxbills and grass finches, which may have some difficulty in cracking harder seeds. Rape seed is an excellent addition, and is greatly in favor among the Germans.

All seed-eaters will be benefited by the addition of small weed and grass seeds, an excellent grade of which is now on the market. Hemp and sunflower are eaten eagerly by grosbeaks and cardinals, but are rich in oils and must be given sparingly. Flax has no superior for weak or run-down birds, and oats are useful for such birds as are able to eat them.

Parrots, of course, live chiefly on seeds. Sunflower, oats and a little canary will be found a very satisfactory mixture, although a few hemp seeds may be added now and then. The feeding of parrots will be discussed at more length later on.

The soft-billed birds offer far greater problems, and it is here that the skill of the aviculturist receives its severest test. A compound of various ingredients, known as insectile mixture, mocking-bird food or simply soft food, is the principal item. This may be mixed as needed, or purchased in ready-to-use packages. The former course is recommended. The base is usually unsweetened biscuit or zweiback, known to be free from baking powder and other

harmful ingredients. Many bird-keepers bake their own biscuit, but where large numbers of birds are kept this involves an amount of labor which generally is prohibitive.

To the base is added egg, either preserved or freshly boiled. Many authorities are opposed to the use of free egg, feeling that its tendency to rapid decomposition and production of harmful bacteria is too dangerous. A large number of boiled eggs are used daily for the bird collections in the New York Zoölogical Park, and no evil effects have ever been noted. If strict cleanliness is observed, there is little fear of trouble. However, preserved egg in tins is to be obtained, or if biscuit is baked, egg can be included in mixing.

A good quality of dried ox-heart or crissel, well scalded, may be added in the proportion of one part of meat to four parts of meal. Dried ants' "eggs" and dried "flies," also scalded, should be mixed in, the quantity depending on the habits of the birds to be fed. Carrot, either grated raw or boiled, and put through a food-chopper, furnishes a desirable element. Cottage or pot cheese, made from sour milk, is undoubtedly a valuable food for all birds that will eat it. It is rich in proteids, and very helpful in the feeding of delicate, insectivorous species.

Small bits of scraped beef, free from fat, are relished by many birds. Immersion for a few seconds in boiling water will be found greatly to reduce the laxative effect. It should never be given to small species, but larger birds will not be harmed by occasional treats, and for some it is a necessity. Raw meat is used too freely by many bird-keepers, whose troubles may often be traced to this source. Various dried fruits, preserved almonds, etc., are sometimes included in soft foods, but, after all, the system just described will meet the needs of most birds.

Living insect food in some form is relished by many

*Courtesy Advanced Agricultural Publishing Co.*

Soemmering Pheasant

Vieillot Fire-back Pheasant

birds of both groups, although a certain few will touch nothing of the sort. Meal worms are the most common and convenient form. They are supplied by dealers, or are easily reared, if one has space to devote to their culture.

Meal worms require dark but well-ventilated quarters, and an even temperature of 65° or 70°. A metal ash-can set away in an out-of-the-way corner will produce enough for a small aviary, but larger establishments find broad, low trays or boxes more convenient. The boxes should be half filled with fine meal, such as flour, middlings and a little bran, whole wheat finely ground being perhaps the best. With this should be mixed a quantity of rags and paper, to relieve the pressure of the meal. A quantity of meal worms must be secured and placed in the boxes. If they are regularly fed on dampened bread (soaked in stale beer, by preference), green foods and fresh vegetables, in due time the larvæ will metamorphose to sluggish black beetles. This usually occurs early in spring, but varying conditions may have a retarding effect. Care must be taken to remove surplus food before it can decompose, and to keep the boxes free from excessive heat or dampness. A short time after the beetles appear they deposit their eggs and promptly die. If all goes well, however, a myriad of tiny wriggling meal worms soon will be found in the meal. They must be well fed and will grow rapidly. When they are required for feeding, they are easily removed by running the meal through a small sieve. Of course, a few must be allowed to mature for a renewal of the supply.

Other insects are equally valuable, but more difficult to obtain. Nothing is superior to the huge Oriental roach, which has gained a foothold in many places. Flies, spiders and certain caterpillars are eaten greedily, if they can be secured. Maggots or gentles are popular with some bird-keepers. If allowed to scour in bran or sand for at least

two days, and then used in moderation, there is no reason why their feeding should be other than beneficial. If allowed to remain another day or two, they will turn into chrysalids, when they make a very good food.

Fruit is the principal article of diet of many birds, such as tanagers, orioles and certain thrushes. Banana is the best and fortunately the cheapest. It should be ripe but firm and free from over-softness. In some cases it is best to cut it into small cubes, which may be swallowed entire, the only objection being that it quickly decomposes when in this condition. Other birds prefer the entire fruit, but some will get badly smeared about the head if it is given in this form.

Oranges are good, but tangarines are better, as they are less acid. Grapes, especially the white sort, are very useful, and should be cut for most birds. Pears are excellent but laxative, and dried raisins and currants are eaten freely, but are likely to contain harmful preservatives. Native berries should be given when in season, but it must be borne in mind that they are strongly laxative in action.

Green food is necessary for all birds that will eat it, and most will do so freely. Chickweed, watercress, dandelion and flowering grasses all are good. In the winter months lettuce is generally obtainable, and will serve to tide the birds over until other greens are again available.

Cuttlefish bone should be furnished all seed-eaters, and a lump of rock salt will be relished by many.

The foregoing directions will serve for most species of the cage-bird group. Those whose care differs, or which need special attention, will be noted in due order.

### Diseases

When properly kept or cared for, birds in captivity suffer from few diseases. It is only when they become run down

from neglect, or during the molting season, that they are likely to be attacked.

Birds respond readily to treatment, and slight ailments may frequently be relieved. On the other hand, when really seriously ill, medicines are of little avail. There is much charlatanry practised in such matters, many persons securing their livelihood by claiming to be able to cure diseased birds, or by the sale of so-called curative preparations which are not of the slightest value.

In treating a sick bird, a most important ally is heat. Sustained, even warmth, with entire protection from draught, will save many an ailing specimen.

For the mild colds and diarrhœas to which cage birds are prone, nothing is better than a few drops of blackberry brandy in the drinking water. In cases of known constipation, a mild dose of Epsom salts in the water, or a drop or two of castor oil, carefully administered, will bring relief. These are the standard remedies of the bird room, and when their use is no longer of avail the aviculturist may be prepared for trouble.

Incorrect feeding is at the bottom of many cases of illness. Seed-eaters are likely to become over-fat and soft-bills frequently become run down from lack of sufficient insect food. A reduction of food and a drop of oil in the first instance, and a few good meals of living insects in the latter, will work wonders.

Many birds, canaries in particular, become affected with chronic asthma. Over-fat birds sometimes exhibit symptoms simulating those of asthma, but these quickly disappear when treated as described above. True asthma is incurable by any means so far devised, though no avian affliction is more profitable to hucksters of cure-alls. Two or three drops of glycerine in the drinking water, for several days in succession, followed by an upbuilding of the

bird's general condition, will cause temporary relief. Four or five drops of tincture of gentian in the drinking water make an excellent tonic for such purposes.

Roup is a disease to which almost all birds are subject. It certainly is not common in cage birds, but game birds, doves and pigeons, hawks and owls are especially subject to it. The symptoms are the running of mucus from eyes and nostrils, frequently accompanied by swollen face and offensive odor. It is highly infectious, and unless affected specimens are especially valuable it is far better to destroy them at once and disinfect thoroughly. If an attempt is made to cure the bird, it should be removed to warm quarters and given the best of food. Eyes, nostrils and throat should be cleared frequently with creolin, potassium permanganate, or lysol. If the face is swollen, the tip of a soft rubber ear syringe, filled with a weak solution of zinc sulphate or potassium permanganate, may be introduced into the cleft in the roof of the mouth or palate. If the syringe is directed forward, on alternate sides, and gently squeezed, the mucus obstructing the passages of eyes and nostrils may be forced out. Pills of quinine and capsicum are of excellent service in such cases. Many proprietary products, claimed to be very efficient, are in the market.

Parrots are subject to colds, which affect the voice and sometimes cause discharge from eyes and nostrils. An excellent remedy is to cover the cage carefully with a cloth and then introduce at the bottom a hot iron plate or coal shovel, on which two or three drops of carbolic acid have been placed. The bird should be allowed to inhale the fumes for three minutes, when the cloth may be removed. Two or three repetitions of this treatment will be found to have a most salutary effect.

Tuberculosis is the bane of the pheasants and doves, and sometimes occurs in parrots and other groups. It has yet

to be identified in cage birds, so-called cases of tuberculosis generally being referable to bird fever. There is no cure known for this disease, and since it is highly contagious scrupulous care should be taken to prevent the introduction of infected birds.

Bird fever and septic fever are responsible for the tremendous number of deaths which sometimes occur among freshly imported cage birds, particularly canaries. Two or three years ago the bird importers of New York suffered severe losses from an epidemic of this disease, which was rife among canaries. Each disease is caused by a specific bacillus. The symptoms in each case are similar—dullness, roughness of plumage and refusal of food—death usually resulting in about a week. Post-mortem examination reveals the presence of whitish nodules in the greatly enlarged liver and spleen in the case of bird fever, but not in septic fever. Both diseases are highly infectious, almost uniformly fatal, and suspected of being communicable to man. As no efficient treatment is known, affected birds should be destroyed and the most rigorous disinfection of the entire premises employed.

Psittacosis is a bacterial disease peculiar to parrots. It is of common occurrence among freshly imported specimens, and accounts, in many cases, for the very high mortality sometimes experienced. Its presence is indicated by dullness, loss of appetite and a greenish diarrhœa. It is extremely contagious and generally fatal. A few cases are on record of its communication to man, a well-authenticated instance having been brought to the notice of the writer within the last few months. Little is to be done for the infected birds, and the most vigilant care in isolating freshly received specimens is the only safeguard against its introduction.

Feather-plucking is hardly to be classed as a disease, but

it resembles the most serious of the list in its obstinacy. The habit may be formed in a variety of ways, faulty feeding and overcrowding being responsible in the majority of cases. It is most noticeable among pheasants and their allies, certain jay-thrushes and the smaller finches. These birds generally practise on the plumage of their neighbors, and the only remedy is to remove the chief offenders.

Parrots, however, more frequently destroy their own feathers, some individuals carrying the practice so far as to denude themselves of almost every feather, excepting those on their heads. The habit is difficult to eradicate, and only the most painstaking care can accomplish any good. Birds which have been fed meat, tea, coffee, candy, etc., are the most frequent offenders. A correction of the diet is the first step, and a few drops of fluid magnesia may be added to the water as an alterative. Spraying of the feathers with quassia has a deterrent effect in some cases. The bird should be given as much attention as possible, and a companion secured for it, if possible. A piece of soft wood to play with may serve to divert its mind. If a cure is finally effected, the owner may consider himself fortunate, indeed, as such cases are few.

Baldness is very prevalent among small birds, more particularly canaries and waxbills. Many causes may contribute to this condition, generally faulty molting in the case of canaries and frequently persistent plucking among the waxbills. The following treatment has been found very efficacious by the writer: Supply the invalid with plenty of green food, and see that its seed is of a nourishing character; linseed is excellent in such cases. Cover a five-cent piece with Epsom salts, dissolve it in a cup of water, and fill the drinker with this solution daily for a week. Then discontinue and add, instead, ten or twelve drops of lemon

juice for a few days in succession. This course will very often induce a healthy renewal of the plumage.

Egg-binding is a very frequent source of trouble. It may be caused by an over-fat condition of the bird, absence of shell-forming grit or, in the case of birds in unheated quarters, by a sudden cold snap. Removal to a warm cage and the anointing of the vent with warm olive oil will generally cause oviposition. If it does not, careful exposure of the vent to steam will almost certainly bring about relief, but the bird must be protected from scalding.

Sore feet are a common complaint. Dirty or unsuitable perches will often bring about such a condition, but many birds, no matter how well cared for, are troubled as old age comes on. The feet should be washed carefully in warm water, well dried and anointed with vaseline or some similar dressing.

Scaly leg, which is prevalent among game birds, is much more difficult to treat. Many prefer heroic measures, such as dipping the feet in kerosene, and good results are not uncommon. Five parts of white vaseline to one part of caraway oil, as recommended by the Maine Agricultural Experiment Station, is the best remedy known to the writer. Its persistent application with a stiff toothbrush will eventually reach and destroy the parasites which cause the incrustation.

Lice are seldom present in a well-ordered collection, and if new birds are isolated for a time there will be little trouble. The habit of covering cages with cloths at night is an excellent means for breeding lice, which find a lodging in the folds of the cloth. When their presence is suspected the occupants of the cage should be removed and thoroughly dusted with Persian insect powder. The cage should be washed with hot water containing some disinfectant, such as creolin; or if this is not practicable, it should be sprayed

with one of the commercial insecticides. The perches should be wiped off with a rag dampened with kerosene oil. If this treatment is repeated once or twice, at intervals of a week, the pests will cease to trouble.

### Selecting Specimens

In choosing birds many points are to be considered. A person of small experience who desires a bird simply for its song cannot do better than to decide on a Canary. Its needs are simple and little knowledge is required to meet them. If he is slightly more ambitious, one of the commoner European finches—a Goldfinch, Linnet or Siskin—might be tried. They are the first step beyond the Canary. The Bullfinch is a delightful pet and easily kept if properly cared for. The small waxbills and grass finches have little song, and some are inclined to be delicate, but their beauty will compensate for the little trouble they make.

The soft-billed birds entail somewhat more effort, but many are almost as hardy as the finches. The Red-billed Hill-tit (or "Japanese Robin"), the Shama Thrush, the Song Thrush and the European Blackbird all are easily kept, although the two latter are inclined to wildness unless thoroughly tamed.

More ambitious collections should not be attempted until one has had some experience with a bird or two. If birds are to be grouped, the greatest care must be exercised in selecting the specimens to be kept together. The larger weavers, troupials, certain thrushes and all parrots and parrakeets are not to be trusted with smaller birds. Some birds are notorious murderers and these will be mentioned farther on. Ordinarily, experience must be the guide, for individuals of ordinarily quiet species are sometimes the worst offenders. It goes without saying that many birds

that will get on perfectly in a large aviary will fight to the death in close quarters.

Some aviculturists have had a prejudice against associating seed-eaters and soft-bills in a single aviary. It is true that in a small cage this may be dangerous, as finches will often eat soft food and become unbelievably fat. But in ample quarters this trouble is not so prevalent, and the members of a mixed collection may generally be relied upon to choose their own food.

Most of the bird and animal importing trade of this country, exclusive of game birds, is in the hands of two or three New York firms with German connections. It is a much more serious undertaking than might be supposed, a well-organized force of travelers, collectors and caretakers being necessary, and prohibiting the participation of smaller concerns. During good weather and under favorable conditions large shipments are received weekly. These arrivals, chief of which, of course, are canaries, are displayed at the establishments of the importers and then selected by the smaller retail dealers. The prices at which these birds are sold are fairly uniform and well established, but those asked by the retailers who distribute them to the public are extremely variable. For instance, piping Bullfinches are wholesaled uniformly at $15 each and usually are bought by dealers simply on the word of the wholesaler, as these birds generally will not perform until they feel at home. After each has displayed his own particular degree of proficiency, the price is set at from $25 for the bird that knows but a single tune to as much as $200 for one which can deliver three or more. The higher prices, of course, are what might be termed "fancy" and few care to pay them. The tyro should be on his guard, and should never pay what seems an exorbitant price until he has assured himself that he is not being fleeced.

No bird should be purchased unless it seems to be in good condition. A few feathers missing or a slightly bedraggled appearance is of small moment, as if the bird is really in good health these defects are soon remedied. A thin, dull-eyed bird, no matter how fine its plumage, should never be taken.

The determination of sex in some species is difficult. In many, of course, the male and female differ entirely in color, and in such cases any reliable dealer will assist the novice in making selections. In others there may be some insignificant distinguishing mark, and some are easily known by size. A few, however, are to be known only by the size and shape of the head and beak, an excellent character for making sure of the sex of difficult species.

All newly purchased birds, no matter how healthy they may appear, should be isolated for a period ranging from a week to a month or more, until it is certain that they are free from disease and well accustomed to the feeding régime. Fresh birds, turned into a mixed collection without an opportunity to rest and become familiar with new foods, are very likely to perish miserably before getting properly oriented. Every aviary or bird room should have its regular quarantine room, where arrivals may be received and prepared for introduction to the collection.

## CHAPTER VI

## PHEASANTS

THE birds of this order (GALLIFORMES) are of the greatest value to man, from an economic point of view. The domestic fowl, the guinea-fowl, the turkey, the pheasants and peafowl, the grouse, quail and partridges, all are included. Each holds an important place in our economy, and farmer, gourmand and sportsman are indebted to them for much. Many of the groups are pre-eminent as pets, or at least for ornamental purposes, while others, such as the grouse, do not thrive in captivity, except under special conditions. Only the hardier families will be considered here.

### Pheasants

Pheasants * are known to every one—to milady, perhaps, by the drooping tail feathers with which she was once wont to adorn her hat; to the sportsman and farmer as the splendid game birds which are increasing so rapidly in our depleted coverts. In spite of this widespread general acquaintance, however, it is remarkable that comparatively few people are aware of the fact that there are nearly one hundred species of pheasants, most of which thrive in captivity with but little more attention than is required for domestic fowls. Even among many of those to whom some knowledge of these birds has brought the realization that there are other pheasants than the Ring-neck the idea is

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prevalent that they are unduly delicate and difficult to keep in confinement. It is the writer's hope that the following pages may serve in some degree to dispel this fallacy.

In the care of pheasants in captivity, it is first necessary to note that there are two distinct methods of treatment. One of these, the rearing of game pheasants for stocking purposes, and also of certain of the more common of the so-called fancy species, is beginning to be pursued on a large scale in this country. This system requires almost unlimited space, which is the basis on which rests all hope of success in producing large numbers of any game bird. It is a subject of great interest and is now receiving the earnest attention of many able men.

On the other hand, the very fact of its bigness excludes it from the field of this work. The bird-lover who keeps a pair of pheasants, or even a series of the more attractive species, cannot be entirely guided by the methods of game farmers on a large scale. His field forms another branch of aviculture, and to an attempt to aid him in this more intensive system the writer will confine himself.

### Housing and Feeding

With a very few exceptions, the pheasants are extremely hardy and require no housing beyond shelter from the cold winds of winter and the beating sun of the summer months. For the first purpose, a low, simple shed, preferably of southern exposure and provided with suitable perches, is quite sufficient. So long as the biting wind and, more especially, dampness are carefully excluded, no artificial heat is required, for these birds are able to endure very low temperatures without discomfort.

A large, well-drained run should be provided, well furnished with shrubs and bushes, a grassy portion being

*Courtesy Advanced Agricultural Publishing Co.*

Brown Eared Pheasant

Silver Pheasant

reserved to provide green food for the inmates. The top must be covered, of course, for pheasants are strong fliers and it is best not to clip their wings if propagation is desired. Care must be taken not to alarm the birds, especially at night, for they are exceedingly nervous and are apt to dart upward, only to wound themselves severely against the netting at the top of their aviary. For this reason, it is far safer to stretch a twine net about a foot below the wire, thus saving the pheasants from possibility of injury.

The staple food of the adults should consist of the best of grain: wheat, buckwheat, barley, kaffir corn and a very little cracked corn. It may be noted, at this point, that Indian corn, doubtless because of its cheapness, is a staple food in this country. For generations farmers have used it for their poultry with apparent success, and the keepers of more delicate birds have very naturally adopted it. There can be no doubt that for sensitive species in confinement, unless very carefully handled, it is a pernicious article of diet. Its constant and unlimited use leads to the accumulation of unhealthy fat, and to enlarged livers, than which there can be no greater evil. Birds on free range, and even those more restricted, during the winter months, may endure or even benefit by a certain amount of this food, but its dangerous tendencies should be borne in mind when a feeding system is being devised.

### Breeding

During the laying season, and just before it, the birds may have a mash composed of one of the numerous pheasant meals advertised, mixed with fine alfalfa meal and a small quantity of crissel or meat scrap. The whole mass should be dampened with scalding water sufficient to make it crumbly. Unless insects are abundant, chopped cooked

meat should be given two or three times weekly throughout the year. Green food must be supplied regularly. Chickweed, which is found universally, is the best for this purpose, but lettuce is an efficient substitute. If grass is given, it must be chopped into very short lengths, as long blades are likely to form an impaction after being swallowed. Of course, if the run is well grassed, this item may be omitted during the summer. Grit is essential, and the drinking water must be fresh and protected from the direct rays of the sun.

Each species must be kept in a separate run, as the males are fierce fighters when confined together, at least when females are present. A number of males of the less pugnacious species will live together in perfect harmony, but if hens are introduced during the mating season disaster is certain to follow. The birds are generally sold in pairs, but with many species it is safer to secure at least two females, as the males are very keen on persecuting their mates, often pursuing them viciously, and if more hens than one are present these attentions are likely to be divided. For the same reason, cock and hen should never be confined together in a small space. During shipment, each bird should be placed in a separate compartment, the top of which has been carefully padded. Although in the wild state, it is probable that most of the pheasants are monogamous, in the case of the true pheasants of the Ring-neck group, and also the Golden and the Lady Amherst, the cocks will mate with from two to four hens. With most other species, including even the Silver, while several hens may be run with the cock, it will generally be found that but one will lay fertile eggs, although, of course, exceptions will occur.

Most of the pheasants lay between late March and the middle of June, the exact dates varying with species, indi-

viduals and climate. If plenty of low bushes are provided, the nest will generally be made in their shelter. Often, however, the eggs will be deposited promiscuously about the run and must be picked up at once, as many birds are confirmed egg-eaters. If the female will incubate, she cannot be excelled for rearing the young, but in most cases she refuses to perform this function. It is customary, therefore, to remove the eggs and place them under a domestic hen. For this purpose a small bird should be chosen, preferably a Silkie, or a gentle bantam, as large hens will crush the fragile shells and trample under foot the tiny chicks.

There is a very considerable difference in the incubation periods of pheasants, and this fact must be considered when mixed clutches are being set. Moreover, some variation in a single species is to be expected, broods of chicks of the same sort sometimes requiring two or three days to complete hatching. The following list gives the approximate time required:

| | |
|---|---|
| Golden | 21 to 22 days |
| Lady Amherst | 22 to 23 days |
| Ring-neck, Formosan, Japanese, etc | 22 to 24 days |
| Reeves, Elliot | 24 to 25 days |
| Silver, Kalij, Swinhoe, Fireback | 25 to 26 days |
| Tragopans, Impeyan | 27 to 28 days |
| Eared | 28 to 30 days |

When the chicks have hatched they may be placed with the hen in a small coop, just as domestic chicks are, with the exception that a small covered run of fine-meshed wire should be placed around it. This should be about two feet square for the first few days, for young pheasants are very wild and must become accustomed to the call notes of the

MUSEUM
TION PARK

foster-mother before they are to be trusted in a larger enclosure. It is an advantage, during this period, to place boards at the sides of the runs. If the chicks cannot see beyond their little world, they have less desire to wander and soon become accustomed to confinement.

If the birds are of the more valuable species, it is best to keep them always in a covered run, where their possible escape may be prevented. This is entirely against the precepts of the modern game farmers, many of whom go so far as to say that pheasants cannot be reared in small quarters. This statement is not entirely true, for pheasants are reared yearly in the New York Zoölogical Park, under the supervision of the writer, in the most cramped runs imaginable. The losses are almost *nil,* and stronger, healthier birds could not be reared in a ten-acre field. The important point with this method is that the runs must be portable, so that they may be removed frequently to fresh ground. If this rule be given faithful attention, and perfect cleanliness maintained, there is no reason why the backyard farmer should not be just as successful on a small scale as the game breeder who operates more extensively.

Pheasant chicks have many enemies and protection from them must be carefully looked after. Cats are the worst of these, but are excluded by the wire, as are hawks and crows. Rats come next, and are best guarded against by fastening the chicks in the coop at night, a practice which is perfectly feasible when only a few broods are being reared in movable runs. If the birds are kept in permanent quarters, rats may be guarded against by having the mesh of the wire so small as to prevent their passage, and sinking it in the ground for eighteen inches, with an outward twist at the bottom.

The food of the young birds is more largely of an animal nature than that of young domestic chicks. The base may consist of any good pheasant meal, of which a number of

sorts are on the market. With this may be chopped boiled egg, fine crissel or meat meal and finely minced green food, such as chickweed, lettuce, watercress or chives. If none of these is available, fine alfalfa meal may be substituted. The whole mass should be dampened with scalding water until it will just hold together when squeezed in the hand. Insect food is very necessary for the more delicate species, and is supplied in the form of ants' cocoons, commonly known as " eggs," and maggots which have been cleaned in dry meal or sand for at least forty-eight hours. Recently there has been an outcry against the use of maggots for young pheasants, chiefly on the grounds that their production is offensive and that they are not essential to the growth of the chicks. This is no doubt true for pheasants on range, which are able to secure all the insect food they require But birds reared in confinement have no such opportunities and insect food of some sort must be provided. If maggots are reared in clean meat, carefully cleaned in bran for forty-eight hours, and scalded before being fed, there is no doubt that their moderate use is of the greatest assistance in rearing the young birds. On the other hand, maggots that have not been properly cleaned are dangerous, and may very probably prove fatal to the chicks which eat them.

When the chicks are about six weeks old, a few small grains, such as millet and canary seed, may be added gradually to their diet and slowly increased until the young birds, fully fledged, are fed practically as are the adults. The chicks should be fed, at first, at intervals of from two to three hours, all food uneaten being removed as soon as the birds stop feeding. The periods are lengthened slowly until grain fed twice daily is found quite sufficient.

Shade is very essential to the young birds and is best provided in the form of natural shrubbery. If this is not available, small A-shaped shelters may be made of boards or

burlap tents erected wherever convenient. The water must be fresh and always in the shade. This point is of great importance, and to its neglect may be traced many of the troubles of pheasant breeders. Many English game-keepers give their chicks no water at all, from their belief that its use would be fatal. This doubtful practice probably originated from unhappy experiences with sun-heated water, and is evidence of the necessity for avoiding such a condition. In any case, the water should be changed at frequent intervals, and if it is not certain that the receptacle will remain shaded, it is safer to remove it after the chicks have drunk.

### The Species of Pheasants

The pheasant family (PHASIANIDÆ) is a very large one, including the Old World quail and partridges, the pheasants proper, the peafowl and the jungle fowl, from which our domestic birds are derived. Although the distinction is purely arbitrary, only those birds which are commonly known as pheasants will be treated here.

About ninety species of pheasants have been described, some thirty of which are more or less common in captivity; most of these are generally to be seen in the New York Zoölogical Park. Many are to be obtained at comparatively low prices, ranging from six dollars per pair for the English Ring-neck to fifty dollars each for the Impeyan.

The best birds for the novice are those of the Ring-neck group (*Phasianus*), which includes about twenty forms. Most common of all pheasants in captivity is the English Ring-neck, the bird which has been used so extensively in game propagation work in the eastern United States. These pheasants are hybrids between the so-called ENGLISH or BLACK-NECKED PHEASANT (*P. colchicus*), which was brought from Asia Minor at a very early date and preserved

on European estates, and the CHINESE RING-NECK (*P. torquatus*), introduced within comparatively recent times. These two have interbred so freely in game preserves as to eliminate completely pure-blooded birds of both forms. The pure English Pheasant, the male of which is characterized by maroon rump and the black neck lacking a white collar, is now exceedingly rare, even in its eastern habitat.

The Chinese Ring-neck, commonly confused with the very distinct Mongolian, is still abundant in China, and is frequently seen in captivity. In color it is lighter than the English Ring-neck and the white collar is usually much wider. This species has been introduced with great success in the Pacific states and has proven hardier than the hybrid.

The male MONGOLIAN PHEASANT (*P. mongolicus*) is very dark in general coloration, somewhat resembling the English Pheasant, except that it has a white collar and white wing coverts. The female, on the contrary, is very pale, but is readily distinguished by her white eyes.

A rather uncommon bird is the FORMOSAN PHEASANT (*P. formosanus*), found only on the island from which it takes its name. This bird resembles the Chinese Ring-neck in general coloration but is still paler.

The smallest species of the group is the JAPANESE or VERSICOLOR PHEASANT (*P. versicolor*). The general tone of the upper portion of the plumage is light slate, the entire breast being a brilliant green. The hen is much the darkest of the group. The Japanese Pheasant has been tried on English preserves, where it has crossed freely with the already mongrel stock.

The only other pheasant found in Japan is the SOEMMERING or COPPER PHEASANT (*P. sœmmeringii*), which has been divided into three subforms, depending upon the amount of white in the lower back. This handsome bird is very uncommon in captivity, and generally commands a

rather high price. Usually it is wild and intractable, but docile specimens are sometimes seen. It is of a different type of coloration from the other species of *Phasianus,* the feathers of the male being of a reddish cast, those of the upper parts being bordered with a brilliant band of copper and white.

With the exception of the last named, the pheasants of the genus *Phasianus* interbreed promiscuously, and the amateur is not always certain as to the derivation of birds furnished by dealers. Most of the pheasants offered for sale in America are bred in captivity, often by men who themselves are not entirely sure of the purity of their breeding stock. Therefore, the greatest care should be taken to investigate the origin of newly purchased birds, to avoid the possibility of producing a flock of undesirable hybrids.

By early systematists, the Reeves Pheasant was included in the Ring-neck group, but later authors have given it a new name, *Syrmaticus reevesi.* The cock is a rather large bird, its general color being gold laced with black. Its tail, however, is its most remarkable feature. This appendage grows to a great length, often reaching more than five feet. For this reason, roomy quarters are required to keep it in good condition. This species crosses readily with the Ring-neck and produces most handsome hybrids, which seem invariably sterile. The Reeves has been tried on English shooting preserves, where it is much prized for its superb rocketing powers. Unfortunately, it is so pugnacious in habit that it will not live amicably with the more docile Ring-necks, and this fact, with the sterility of the hybrids, has much reduced its former popularity in this respect.

The Golden (*Chrysolophus pictus*) and the Lady Amherst Pheasants (*C. amherstiæ*) are among the most brilliant of known pheasants. The Golden is the more

gorgeous, the cock being characterized by bright yellow crest, flowing orange and black cape, green back and yellow rump, set off with a breast of dazzling red. He is an active bird, constantly spreading his scintillating ruff in display as he darts about. Unfortunately, it is next to impossible to secure birds without an infusion of Amherst blood, so readily do the species cross. The females are particularly confusing, even the pure ones being much alike. The legs of the Amherst, however, are dark greenish, while those of the Golden are yellow, and the eyes of the former are surrounded by a bare patch which is almost entirely absent in the Golden.

The Lady Amherst cock is somewhat larger than the Golden, with a much longer tail, and his coloring, while of the same general pattern, is more subdued in tone. Most of the upper parts are metallic green edged with black. The crest is dark red, the spreading cape white tipped with black and the lower back pale yellow. The upper breast is green also, while the abdomen is white. Lady Amherst and Golden males do not assume the full adult plumage until the second summer.

The male hybrids between these two birds are most gorgeous creatures, showing every possible combination of the colors of the parent species. They are quite fertile and all degrees of blood may be obtained.

Both of these species are desirable aviary birds and become very tame and confiding, and, in spite of their active habits, endure close confinement perhaps better than any other pheasants. The Goldens are particularly docile. Both are hardy and easily kept. Next to the Ring-neck, the Golden is the most common pheasant in captivity and is to be obtained at a comparatively low price. The Amherst, for some reason, is never so abundant, and its value is considerably greater.

The Silver and Kalij Pheasants form a genus (*Gennæus*) which includes a large number of handsome birds, many of them so closely allied as to make their identity difficult for the novice to determine. Of these birds, the most abundant in confinement is the Silver (*G. nycthemerus*). After the Ring-neck and the Golden, this is the species most commonly seen in collections. The cock is a conspicuous bird, snowy white above, with black vermiculations and the crest and lower parts glossy blue-black. It breeds freely, the chicks are easily reared, and altogether it is a most satisfactory bird. Individuals often become exceedingly tame and may be allowed to run about the grounds. Unlike some smaller species, they are quite able to defend themselves against prowling cats, and no danger is to be apprehended from this source.

Closely allied to the Silver is the Lineated Pheasant (*G. lineatus*). It is an uncommon bird, but occasionally to be had from dealers. It differs from the Silver in its somewhat smaller size, and in the relation of dark and light vermiculations in the upper parts, the result making it a much darker bird than its relative.

The Kalij Pheasant cocks are black in general coloration, the species being differentiated by the distribution of white markings. The hens are all very much alike and only distinguishable by careful comparison.

The most common is the Black-crested Kalij (*G. leucomelanus*). The male is black throughout, the feathers of the lower back broadly tipped with white and those of the breast tinged with ashy. This pheasant is commonly sold as "Melanotus."

The Melanotus or Black-backed Kalij (*G. melanotus*) is a much rarer bird and lacks the white tips on the back. These two species are very commonly confused and much interbred, so that pure birds are difficult to obtain.

Indian Peahen and Chick

*Photograph by Barbara Baron*

White Peacock Displaying
(Property of Mr. Kenyon V. Painter)

The handsomest of the Kalijes is the WHITE-CRESTED (*G. albocristatus*). The crest of the cock is very long and flowing, and pure white in color. He possesses, also, the white-tipped back and ashy breast. This is an uncommon bird, very seldom seen in collections.

HORSFIELD'S or the BLACK-BREASTED KALIJ (*G. horsfieldi*) is the darkest in color, and probably the rarest of those which have reached civilization alive. The cock is glossy blue-black, the only white markings being those of the lower back.

The SWINHOE PHEASANT (*G. swinhoei*) seems to fall in this group, but is quite distinct from its congeners. It is not rare in confinement and is a most brilliant and pleasing bird. The general color of the cock is a metallic blackish-blue, with white crest and central tail feathers. The upper back is white also, with a bright patch of maroon at each side. The hen is mottled black and buff, with bare, red face, and is easily distinguished from all others.

The ELLIOT PHEASANT (*Calophasis ellioti*) is a Chinese species, which is always obtainable from dealers. The cock is strikingly marked, the general coloration being rich, golden-brown, set off by white underparts and wing bars, and grayish-white neck. This bird does not seem as hardy as most others and is rather difficult to acclimatize, but once established is as long-lived as any.

Curious little birds with superficial resemblances to the peacock are the PEACOCK PHEASANTS (*Polyplectron*). Although six species are known, but two have ever reached America alive, and only one of these, the Common (*P. chinquis*), is usually to be had. The cock and hen are much alike, dark grayish in color, the feathers of the lower back, wing coverts and tail being ornamented with round ocelli or "eyes." In the male these eyes are a brilliant green, but in

the hen they are simply dark spots without iridescence. This is a rare species, but very long-lived once it is well established. It is much more difficult to breed than some others, but success has been attained by at least one American aviculturist. The normal clutch consists of two eggs, but these are usually followed, after a short interval, by a second pair.

The only pheasants in which the plumage of the male does not differ from that of the female are the Eared Pheasants (*Crossoptilon*). But one species of this genus, the Brown Eared Pheasant (*C. manchuricum*), has ever been alive in private hands. Both sexes are dark brown in color, with flowing white ear-tufts, the arched tail whitish tipped with black. Male and female may be distinguished by the spurs of the former. This species is generally to be obtained from dealers, but of late years it has become rather uncommon. Although the Manchurian is of a most quiet disposition and thrives well in captivity, it is a difficult species to breed. A curious characteristic of birds of this species is a tendency to nibble at the tail feathers of their mates. A pair of birds kept in close confinement, without the variety offered by more free range, almost invariably develop this habit, which adds nothing to their good appearance.

The Fire-back Pheasants are a compact group of eight species, found only in the Malay Peninsula and neighboring islands. As is indicated by their habitat, these birds require artificial heat if they are to do well during the winter. Moreover, all are high-priced and rare, so that, although of great beauty, they are not suitable birds for the novice. The most common species is the Siamese Fire-back (*Diardigallus diardi*), followed by the Bornean and Vieillot's Fire-backs (*Lophura*).

The Tragopans (*Tragopan*) are a group of pheasants distinguishable at a glance from the others. They have no

ornamental plumage developments, even the tail being short and rounded. The face is bare and highly colored in the males of most of the species, and all have fleshy horns and a brilliant dewlap, which are exposed only during display before the female. The general color of the males is red or brown, interspersed with spots and mottlings of various shades, and reticulated with black. The females are all very much alike and difficult to distinguish.

There are five species of Tragopans, three of which are not uncommon in captivity, although the price asked is always high. These are Cabot, Temminck, and Satyr or Crimson, relatively abundant in the order named. Blyth's and Black-headed Tragopans are seen very rarely, the latter never having been brought alive to America.

All of these birds live well in confinement, requiring no artificial heat. They are largely fruit- and plant-eaters, and their diet in captivity should include soft fruits and berries, plenty of green food and occasional meals of boiled rice. They also differ from other pheasants in their selection of a site for the nest, which usually is built upon a deserted bird's nest, at some distance from the ground.

The male Impeyan Pheasant (*Lophophorus impeyanus*) is among the most wonderfully colored of living birds. The surface of the upper body feathers is provided with microscopical prisms, which reflect the light in a flood of iridescence that is difficult to describe. The head and spatulate crest are green, the neck bronze and the rest of the upper surface purple, with the exception of a white patch on the lower back, hidden by the folded wings. All of these colors have the brilliance of molten metal, scintillating with every movement of the bird. The hen is clothed modestly in mottled brown and black.

Impeyans are hardy birds and easily catered for, but although generally to be obtained they are always expen-

sive. They are very quiet, but, like the Manchurian, difficult to breed, although young have been hatched repeatedly in this country and occasionally reared. The beak is strong and powerful and in constant use for digging in the soil of the enclosure.

## CHAPTER VII

## PEAFOWL, GUINEA-FOWL AND QUAIL

### Peafowl

THE peafowl belong to the same family (PHASIANIDÆ) as the pheasants, from which they differ in no important characters. Their most striking feature is the long train, which, by the way, is formed by the upper tail coverts and not by the tail proper.

There are two species, the most common of which is the INDIAN PEAFOWL (*Pavo cristatus*). This bird is a native of India and Ceylon. Although accustomed to a tropical climate, its hardiness is truly remarkable, for no degree of cold seems to affect it. The writer has repeatedly seen birds, after a frosty night spent on a lofty bough, shake the heavy snow from their backs and scale smoothly to the ground, with as little concern as though the scene were the forests of Ceylon.

Little provision, then, is necessary for the housing of peafowl. If they must be kept confined, the run should be as large as possible and well grassed, for these birds will not thrive in small quarters. Under such circumstances, it is better to have a shelter of some sort to cover the bird's roosting-place.

Peafowl are much better at liberty, and if possible should be allowed to enjoy it. If kept confined for a few days in a wire pen, a newly acquired pair may be let go, with reasonable assurance that they will not stray. Some individuals, however, are peculiarly persistent in this respect, and it may be necessary to let only the cock go at first, keep-

ing the hen where he can see her, until he is satisfied with his surroundings.

Dogs are the worst enemies of peafowl at large, and strange as it may seem they have little difficulty in approaching the birds. Stray dogs should be kept from grounds in which peafowl are at liberty.

The loftiest bough or ridge-pole is not too high for these birds of Pan, and some such location will form the nightly perch. The peacock is very prone to the utterance of loud and unearthly shrieks, particularly at night, and for that reason should be encouraged to roost as far as possible from dwellings.

The feeding described for pheasants is equally suitable for peafowl. A mixture of sound grains is the chief item, supplemented by occasional feeds of game food or mash. Chopped vegetables and abundant green food must be furnished when grass is not accessible to the birds. Table scraps are not suitable for any birds, with the possible exception of barnyard chickens.

The peafowl is polygamous and one cock may be kept with two or three hens. The birds do equally well in larger flocks, including several males, if there is room enough for the weaker birds to avoid the more pugnacious individuals. The battles of peacocks are seldom sanguinary or of long duration, but the victor will cruelly persecute the vanquished if he has no means of escape. Peacocks must not be allowed access to poultry yards, for some are murderously inclined, and will play havoc among young chicks.

Peahens usually lay in the early summer, the clutch varying from two eggs to six. Females do not breed until two years old. The period of incubation is about twenty-eight days. It is by far the best to let the mother rear her own brood. Domestic hens will not range far enough to allow the chicks to find the great number of insects they

require, and will cease to hover them when they are a few weeks old. Peachicks require the mother's warmth much longer than domestic chicks, and only the peahen is willing to provide it. If a substitute must be found, a quiet turkey is the most suitable.

The hen and chicks should be allowed full liberty, confinement being fatal. They may be tried with the foods recommended for young pheasants, but it will be found that insects they find for themselves attract them much more strongly than meal.

The wings of peachicks are well developed when they leave the shell and they are very soon able to fly. They feather rapidly and the cocks may soon be distinguished from the hens by their larger size, longer crests and bluer necks. An advance toward the wonderful adornment of the adult male is made in each successive year, but it is not until the bird is three years old that the full plumage is attained. The young female shows little change, although the neck becomes somewhat greener. The feathers of the train are dropped late in June or early in July, and although their renewal commences at once, the growth is not complete until December or January.

Several variations from the normal plumage of the Indian Peafowl have been established. The most attractive is the WHITE, and when clean and in good condition no bird is more beautiful. It requires ample space, however, to keep itself presentable, and even under the best of conditions is very likely to be more or less soiled. White Peafowl, like all albinos, breed true when mated together, but the young are not so easily reared as are those of colored birds.

The PIED PEAFOWL is easily produced by crossing white and colored specimens. The most usual pattern is normal body and train, with white wings and particolored heads and neck. The females are frequently nearly white.

The Black-winged or Japan Peafowl is now well known to represent a mutation from the common stock and not a distinct species. The cock differs from the typical bird in having the wing coverts iridescent black, instead of barred with white. The chicks are white when hatched. The cocks gradually become colored, but the females remain mostly white.

The Javan or Green Peafowl (*Pavo muticus*) is found in Burma, the Malay Peninsula and Java. In most respects it closely resembles the Indian Peafowl, but is easily distinguished by the green, scaled feathers of the neck, black wings and long, constricted crest, as contrasted with the fan-shaped ornament of its congener. The hen equals her lord in beauty, but lacks the train. Hens of this species are curiously rare, two cocks all too frequently being sold for a pair.

This bird is less hardy than the Indian species, and cannot endure our winters without shelter. Otherwise its treatment does not differ from that of the common bird.

The cocks are uniformly pugnacious, and may become really dangerous.

Hybrids between the two species are not uncommon and usually share the characters of each parent.

## CHAPTER VIII

## WATER-FOWL

After the gallinaceous birds the water-fowl are next in economic importance. Over their more prolific rivals they have the advantage of extreme hardiness and general freedom from sickness. Both ducks and geese have long been thoroughly domesticated, as is evidenced by the many well-differentiated breeds. Swans, too, have become well accustomed to captivity, but have shown no tendency to variation. Only the wild species will be considered here.

In common with other game birds, the water-fowl now are receiving a large share of the attention of the propagator. Much has been learned concerning their care and management, but the problem of breeding many species is still unsolved. This being the case, the amateur has an extra incentive, for he is as likely to reach the solution as is the worker on a larger scale.

As in pheasant-keeping, water-fowl culture is divided into two groups. While the treatment of the birds in large preserves is essentially the same as that practised by the veriest amateur, the details necessarily vary. We shall confine ourselves here to the management of the smaller enterprise.

Of the water-fowl (Anseriformes), there are about two hundred and seventy-five species, which may be divided roughly into the ducks, geese and swans. Practically all of the forms may be kept in captivity with a considerable degree of success. Most are perfectly hardy, but a few, such as the Tree Ducks, require warmth in winter.

### Wild Ducks

When the hardiness, simple wants and surpassing beauty of many ducks are considered, one is not surprised at their increasing popularity, but rather that their keeping has not become more general.

For most species water is a necessity. The pond need not necessarily be large, but it is of the greatest importance that the water be fresh and clean. If a running stream or natural pond is available, only some slight adaptation is necessary. If neither is to be had, the construction of a small, concrete pool is a matter of no great difficulty.

At any rate, means for securing a constant supply of water must be secured, and if it is possible to arrange for complete drainage of the pond, so much the better. It is a great advantage to be able to remove all of the water on occasion.

If the sides of the pool are of soil, it will be necessary to build them up firmly with stone and gravel. Ducks have a habit of working at the banks with their beaks, and their feet also rapidly wear down the soil as they enter or leave the water.

The planting of various edible aquatic plants, such as wild celery (*Vallisneria*), wild rice (*Zizania*), etc., is desirable, but not practicable in a small pond, as they will be destroyed quickly by the ducks. In large bodies of water, on which a small number of birds are quartered, such cultivation is perfectly possible.

The pond and as much adjoining land as is available should be surrounded by a wire fence. A three-foot fence will restrain most pinioned water-fowl, but a greater height is recommended to exclude dogs, foxes, etc. If attacks of rats, cats and other marauders are feared, precautions in

fence-building should be taken, as recommended in the chapter on pheasants.

The enclosure should support a good supply of grass and a portion, at least, must be thickly planted with hardy shrubs. Rhododendrons, mountain laurels, willows, etc., are excellent. Bottomless boxes, with holes large enough to admit a duck, may be placed here and there on the ground in the shrubbery, for it is here that the birds will choose to lay their eggs. Most ducks, however, will make their nests in the shelter of the leaves, rather than in boxes.

For Wood and Mandarin Ducks, which in the wild state lay their eggs in hollow trees or in similar positions, special nests are best. In the New York Zoölogical Park, we have had excellent results with boxes placed about three feet above the water, a few feet from the shore. These boxes are about eighteen inches in each dimension, with a hole four inches in diameter, which is large enough to admit a Wood Duck, but not an intrusive Mallard. It is necessary to provide a runway for the bird and nesting material of some sort, as of course the duck will not carry any.

At the latitude and altitude of New York City, the hardier ducks do not require shelter in winter. During very severe weather, it may sometimes be necessary to erect a windbreak of straw or brush, attached to a wooden frame. It is very difficult to persuade water-fowl to enter a covered building or shelter. In localities where the cold becomes extreme, protection of some sort may be needed, and is best provided by means of low brush fences, floored with leaves or straw. Constant feeding will accustom the birds to the place, and soon they will learn to use it regularly. If the pond is small, or the birds can be withdrawn into a smaller portion, it is not difficult to drive them into an unheated shed, where the nights can be passed. But it should be borne in mind that any driving of diving ducks when the

pond is frozen over is fraught with danger, as the birds may dive under the ice and fail to reappear.

The usual grains—wheat, barley, kaffir corn, etc.—form the staple food of adult ducks. Cracked corn is much used in America, and it must be admitted that this grain does not seem to exercise the adverse effect on ducks that it does on most other birds. Many breeders give their birds occasional mashes of duck meal. Spratt's Patent Game Food, dry, thrown on the water two or three times weekly, will be found to benefit the birds. Dry bread crusts are always relished. Green food is very necessary, all of the usual kinds being eaten greedily. Ducks are especially fond of water hyacinth, duckweed and watercress. Fresh grass, cut in short lengths, and thrown in small quantities into the water, is excellent.

The above items will be found sufficient for surface-feeding species. The diving ducks, such as Canvasbacks, Scaup, etc., are no more difficult to keep in health, once they have become accustomed to captivity. When first received from the trapper, it is necessary to confine such birds in small, dry quarters, well secluded, until they are feeding satisfactorily. When finally well on grain, they will thrive in common with the other birds, but will benefit by a bit of chopped fish or a few minnows, once or twice weekly.

Unless a covered aviary is provided, or there are unusual facilities for catching the birds easily at intervals and clipping their wings, it is best to pinion them permanently. The operation is easily performed. A point just beyond the bastard wing or thumb should be selected. One or two of the primaries should be drawn and a tight ligature of stout, uncolored twine applied. The bone is then severed with a pair of strong pruning-shears. If the tie has been properly made, there will be no blood. If the weather is warm, an antiseptic powder may be applied, but if the birds

are returned at once to the water this generally is not necessary. The birds need not be caught again, as the twine will slough off as the wing heals.

Most water-fowl breed early, in April or May, or even in March if the season is moderate. At this time the greatest care must be taken to avoid disturbance of the birds. Especially quarrelsome sorts, such as Egyptian Geese and Sheldrakes, should be watched and prevented from persecuting or even killing their companions. Most species are monogamous, and follow their instincts closely. The Mallard is a notable exception, one drake to two or three ducks being a suitable proportion to insure the best results.

Ducks are very shy about laying, and if alarmed while nesting are very likely never to return. If the eggs are to be removed, the safest method is to watch until the full clutch has been deposited. Under exceptional conditions good results in rearing young may sometimes be attained by allowing the duck to perform her natural functions. But ordinarily it is far safer to entrust the eggs to a bantam or other small fowl.

When the hen comes off to feed, the eggs should be covered with a soft cloth, in emulation of the habit of ducks. It is necessary also to dampen the eggs frequently with tepid water, particularly as incubation becomes well advanced.

The eggs of most ducks hatch in four weeks. Young divers frequently appear several days sooner and Teal require but three weeks. The ducklings will not require food for the first twenty-four hours and should remain undisturbed in the nest with the foster-mother. At the end of this period they should be removed to a small coop and run, as described for pheasants.

The treatment of ducklings is very similar to that of young game birds. They should not be allowed to enter

water, and that provided for drinking must be in a shallow receptacle. Young ducks are easily soaked, often with fatal results.

Their first food may be boiled egg and biscuit crumbs, dampened. It is also advisable to float ants' cocoons and duckweed on the water. The young of many species do not readily learn to feed and it is here that the greatest difficulty lies. Slowly moving insects, such as newly hatched or drenched flies, will often attract the ducklings' attention and form the first meal.

When the young birds are feeding well, they may be given one of the standard duck meals or the mixture recommended for pheasants. Boiled egg may be continued for a time, and green food, preferably duckweed, furnished liberally. Earthworms are an excellent food for all ducklings large enough to eat them.

As the youngsters progress, small grain should be introduced gradually into their diet. When six or eight weeks old, they may be allowed to enter the water and may be considered out of danger.

Dampness and hot sun are fatal to ducklings, as well as pheasants, and must be avoided.

When the young birds are about one week old, the last joint of one wing, just beyond the thumb, should be removed with a sharp pair of scissors. As the wing is still cartilaginous, there is no resistance and no bleeding. It is therefore not necessary to make a ligature, but it is well to apply a bit of antiseptic powder, such as iodoform or xeroform. This will prevent infection and blowing by flies—a not uncommon trouble.

Of the many species of wild ducks commonly kept in confinement the MALLARD (*Anas platyrhynchos*) is the most abundant. Its ready acceptance of captivity led to its domestication at a very remote period, and the many domestic

*Photograph by F. R. Sanborn* *Courtesy New York Zoological Society*

Mute and Trumpeter Swans

*Photograph by F. R. Sanborn* *Courtesy New York Zoological Society*

Cereopsis Geese and Goslings

breeds we now possess have been developed. The Mallard is much the easiest of all wild ducks to manage and rear. Its propagation is carried on extensively on game preserves and great numbers are reared yearly. An excellent field awaits the producer of these birds for market, as the demand is heavy and but a small portion has so far been met.

The Black Duck (*Anas rubripes*), although closely allied to the Mallard, does not share its domestic tendencies. It is shy and secretive, and although many attempts have been made to rear it on a large scale, there has as yet been no notable success.

The Pintail (*Dafila acuta*), Baldpate (*Mareca americana*) and Shoveller (*Spatula clypeata*) are other native American species (the first and last are found in the Old World as well) which are attractive for their ornamental value. All are hardy and easily kept, and all have been bred in captivity on occasion.

Of the three North American Teal, the Green-wing (*Nettion carolinense*) is the smallest, and likewise the hardiest. The Blue-wing (*Querquedula discors*) and Cinnamon (*Q. cyanoptera*) are well enough during warm weather, but in New York at least cannot endure the severe winters we sometimes experience. The Gadwall (*Chaulelasmus strepera*) is another which does not like cold weather, although thoroughly acclimatized specimens get on well enough.

Of foreign species, South America offers some most attractive forms. The Chilian Pintail (*Dafila spinicauda*) and the Chilian Widgeon (*Mareca sibilatrix*) are both hardy and handsome, requiring no artificial heat during the winter. In both species the sexes are alike in color. The many beautiful South American Teal—the Brazilian (*Nettion brasiliense*), the Black-capped or

VERSICOLOR (*Querquedula versicolor*), the CHILIAN (*Nettion flavirostre*) and the lovely and most recently imported RINGED (*N. torquatum*)—are most engaging. Some, and perhaps all, no doubt are hardy, but their rarity impels the furnishing of heated quarters during the winter.

The best known Australian species is the AUSTRALIAN GRAY DUCK (*Anas superciliaris*), a sturdy bird resembling our Black Duck.

Our own WOOD DUCK (*Aix sponsa*) and the MANDARIN (*A. galericulata*), of eastern Asia, are easily the most beautiful of all ducks. Although the males are totally different in their wonderful coloring and patterns, the females are strikingly alike and not easily distinguished by the novice. But a comparison of the wide, white eye-ring of the Wood Duck with the much smaller marking of the Mandarin furnishes a ready key.

Both species are among the hardiest and most easily kept of ducks. A pair will thrive in summer in the smallest of enclosures, if properly planted, and with a washtub for a pool. In winter, if open water cannot be kept, they will be perfectly happy in a shed or box stall. At liberty on a larger pond, nothing could be more attractive than a mixed flock of both species.

The Wood Duck is a very free breeder, if provided with a nest as already described. The Mandarin is much shyer, but is not at all difficult to breed. Broods of both species are reared yearly in the New York Zoölogical Park. The young birds are exceedingly wild and active. They are able to squeeze through the tiniest hole and can climb like mice. It is therefore necessary to confine them tightly for the first few days, until they become thoroughly familiar with their surroundings and foster-mother.

The Tree Ducks, of which there are a number of species, mainly tropical, live well in captivity, but cannot endure

severe winters out of doors. All are fairly large birds, with long, well-developed legs. They perch freely, and lay their eggs in hollow trees. The best known species are the FULVOUS (*Dendrocygna fulva*), the WHITE-FACED (*D. viduata*) and the RED-BILLED or BLACK-BELLIED (*D. autumnalis*).

In South America the writer has seen Tree Ducks perched upon a large, dead tree in such countless numbers that at a distance it appeared once more to be clothed with leaves. But a closer approach caused the birds to arise in clouds, as though a hurricane had again robbed the veteran of its foliage.

Of the Diving or Sea Ducks, North America boasts some superb species. The CANVASBACK (*Marila valisneria*), the REDHEAD (*M. americana*), the SCAUP (*M. marila*) and the LESSER SCAUP (*M. affinis*) are the best known. All are easily kept if treated as already described. The Redhead has been bred several times; the Canvasback was successfully reared for the first time on the estate of William Rockefeller in 1915, but neither Scaup has yet nested in captivity in this country.

Of the European divers, the POCHARD (*M. ferina*), which is intermediate in appearance between the Canvasback and the Redhead, is the most common in captivity. The TUFTED DUCK (*M. fuligula*) is much like a Scaup, but entirely black above and white below, with a well-developed, pendent crest. The WHITE-EYE (*M. nyroca*) is one of the smallest of divers, rich mahogany in color, the irides of the male being pure white. This bird was bred in the New York Zoölogical Park in 1915 for the first time in America.

The ROSY-BILLED DUCK (*Metopiana peposaca*), of southern South America, is one of the handsomest of the divers. The male is blackish above and gray and white below, in strong contrast to which is the brilliant pink beak. The

female is a somber brown, with dark beak. This bird is indifferent to cold and lives well in confinement.

The Sheldrakes, as a group, are intermediate between ducks and geese. They are birds of comparatively large size, and spend much time in grazing, after the fashion of geese. All of the species are exceedingly quarrelsome during the breeding season, and must be watched closely to prevent their killing weaker birds.

The Ruddy Sheldrake (*Casarca casarca*) is the best known species. Both sexes are bright rufous in general color, the male usually being distinguishable by his larger size and a black ring about the neck. It is a hardy species and not affected by cold. It has been bred frequently in America.

The Paradise or Variegated Sheldrake (*Casarca variegata*), of New Zealand, is not common in captivity in this country. The male is handsomely colored, with black head and neck, gray back, black tail, chestnut breast and white wing coverts. The female is somewhat similar, but has the head and neck pure white. This species breeds freely in European collections, but is exceedingly pugnacious.

The Common European Sheldrake (*Tadorna tadorna*) is a strikingly handsome bird, the sexes being marked alike with contrasting patches of green, chestnut and white. Unfortunately, it is an exceedingly difficult bird to establish in captivity, and cannot be induced to live for long in this country.

### Geese

The geese in general are even easier than ducks to keep in health. Water is less essential for their needs, the chief requirement being grazing ground. Geese of most species spend more time on land than afloat, and in summer will

nearly support themselves by eating grass. The same grain supplied for ducks will satisfy geese, and a good supply of green food during the winter months is a necessity.

Most of the species are very hardy and require no protection during the winter. Although living for years in captivity, and keeping always in the best of condition, few species, with the exception of the Canada Goose, breed well.

Geese are quite safe in mixed collections, unless inclined to pair in the spring, when they may become dangerous to their smaller neighbors.

The CANADA GOOSE (*Branta canadensis*) is the American species most commonly seen in collections. It is one of the few geese which breed well in captivity, and there is no reason why it should not eventually become thoroughly domesticated. It is much in vogue among propagators, and large numbers are reared annually for stocking purposes.

Like all wild geese, the Canada is strictly monogamous, pairs remaining mated for many years. Nesting takes place late in March or in April, according to weather conditions. Three to seven eggs are laid, incubation lasting twenty-eight to thirty days. The young are dirty yellowish when hatched. If grazing is available, no food for the young birds is necessary, as grass is all that is required for their sustenance. Unlike ducks, geese are the best of parents, and care for the young with the greatest solicitude. When conditions are at all favorable, young Canada Geese, if allowed to remain full-winged, will seldom permanently leave their home.

Canada Geese are exceedingly quarrelsome during the mating season. Pairs not only will refuse to allow others to nest in their vicinity, but are most vindictive in the destruction of the nests and sometimes also the nests of birds of other species. This pugnacity may take curious

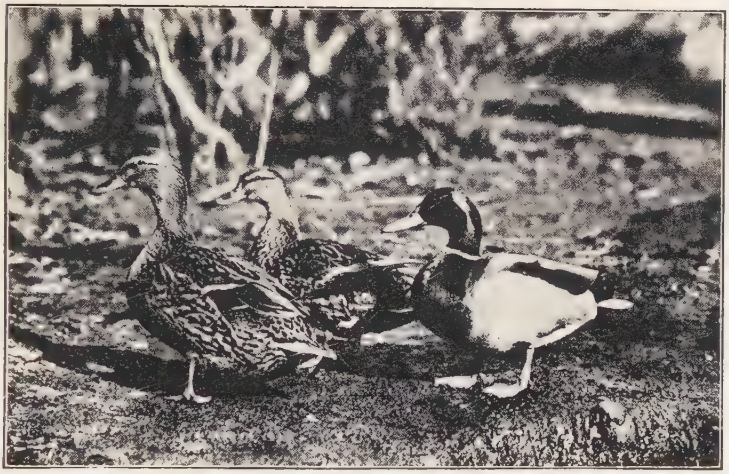
turns, a pair of birds in the New York Zoölogical Park once having kidnapped the young of other pairs until they had accumulated no less than eighteen goslings, all of which they triumphantly reared!

Hutchins Goose (*B. canadensis hutchinsi*) is a small edition of the Canada Goose, and the Cackling Goose (*B. c. minima*) is similar but still more diminutive. Strangely enough, although obviously very closely allied to the Canada Goose, neither of these birds has been bred in captivity in America, although the Hutchin, at least, has reared young in Europe.

The various forms of the Brant (*Branta bernicla*) fall in the same category. Three birds of the eastern subspecies, all full-winged, have lived in the New York Zoölogical Park for nearly fifteen years, but have never shown any inclination to breed. The European Brant does not seem difficult to breed in captivity on its native continent.

The three Snow Geese, the Greater (*Chen hyperborea nivalis*), the Lesser (*C. h. hyperborea*) and the Ross (*C. rossii*), are pure white in color, with black primaries. They differ from one another chiefly in size and other minor particulars. None of the forms has ever reared young in captivity in America, although there seems to be no great difficulty about it in Europe. In 1912 the writer saw a pair of Snow Geese, with three well-grown young, which they had reared in a tiny paddock in the Zoölogical Gardens of London.

The genus *Anser* includes the ancestors of our domestic breeds, the Gray Lag Goose (*Anser anser*). This European species, although domesticated in remote ages, is a very shy breeder in captivity. It has been bred at least once in America, the eggs being rescued from the water, where they had been dropped, and two goslings hatched and reared by a hen.



*Photograph by E. R Sanborn* *Courtesy New York Zoological Society*

Mallard Ducks

*Photograph by E. R. Sanborn* *Courtesy New York Zoological Society*

Mandarin Duck

There are numerous other European species of *Anser,* the most common being the Bean Goose (*A. fabilis*) and the Pink-footed (*A. brachyrhynchus*). These birds are somewhat alike but easily distinguished by the yellow feet and bill markings of the first-named, compared with pale pink in the latter.

America has one representative of the group, the American White-fronted Goose (*A. albifrons gambeli*). A large flock of these birds has lived almost at liberty for a number of years in the New York Zoölogical Park, but its members have never shown any tendency to pair.

The Upland Geese (*Chloëphaga*) are natives of southern South America. Once fully acclimatized, they are able to resist our coldest winters. All are handsome birds, the best known species being the Magellan (*C. magellanica*), of which the male is white, with back pearl-gray barred with black, as are the sides of the body. The female is similarly marked, but with the ground color bright chestnut. This species is bred in some numbers in Europe.

The Cereopsis Goose (*Cereopsis novæ-hollandiæ*), of southern Australia and Tasmania, is becoming so rare that collectors have to depend upon captivity-bred birds. It is dark gray in color, with a few large, brownish spots. The base of the short black beak is covered with a greenish cere. The legs are red but the feet are black, giving the bird the appearance of having recently walked in mud. This goose is distinctly a grazing species, never entering the water if it can be avoided. It is not sensitive to cold, but during the winter must be well provided with green food, which forms its chief sustenance. During the breeding season the male is exceedingly pugnacious and powerful enough to kill a Sandhill Crane. A pair in the New York Zoölogical Park have reared young each year since 1910. The goslings are prettily striped with black and white, and although they

feed mostly on grass, they can be taught to eat the food recommended for ducklings.

The Chinese Goose (*Cygnopsis cygnoides*) has become fully domesticated, and has given rise to distinct varieties, one of which is pure white. The typical form is grayish-brown in color, with a dark stripe down the back of the neck. The beak is black, with a large, round knob at the base, which is more conspicuous in the male. It is a large bird and exceedingly noisy.

The Egyptian Goose (*Alopochen ægyptiacus*) is very common in captivity, and breeds so readily that it may almost be said to have become domesticated. It is a hardy and handsome bird, being in general reddish-chestnut above and fawn below, with a chestnut patch on the abdomen, the whole set off by the metallic black of wings and tail. Its disposition, however, is so fierce and vindictive that it is not safe in a mixed collection. The writer has known a particularly savage male to kill an incubating Canada Goose and a Black Swan, almost while the attendant's back was turned.

The Muscovy Duck (*Cairina moschata*) is in reality a goose, and forms, with several allied species, one of the suborders of that group. It has become perfectly domesticated, and several color-varieties have arisen—pied, white and lavender.

The typical wild bird which is found throughout tropical America is very uncommon in captivity. It is pure black in color, with the exception of the upper and under wing coverts and axillaries, which are white. A pair of these birds, secured in Colombia, have bred in the New York Zoölogical Park, the young being colored like their parents.

The Muscovy drake is much larger than his mate, often doubling her weight. He is often savagely inclined, and not always safe in mixed collections. Muscovies hybridize

freely with domestic ducks, the offspring being invariably sterile.

### Swans

Because of their large size and undoubted grace, swans have long held a premier position in the estimation of keepers of water-fowl. All of the species are hardy, so far as temperature is concerned, and easily kept. Almost more than any other anserine bird, water is essential for the well-being of swans. Perfectly at ease in their natural element, few birds are more awkward or unlovely than a swan ashore.

Swans do best in a large body of water, well supplied with aquatic plants. When these are not available, the birds may condescend to go ashore and graze a bit, but are evidently not happy while doing so. Adult birds may be fed on the same grain provided for ducks, and will relish bread crusts and Game Food, if thrown on the water. Green food in some form must be provided in winter.

In many places where the severity of winter makes the care of the birds difficult, it is customary to make temporary enclosures of wire netting, by means of which the swans may be confined to the most sheltered position. At this season the males are less quarrelsome than during the spring, and may be gathered together with safety.

Seven species of true swans are recognized, of which five are white in color. The most abundant in captivity is the Mute Swan (*Olor olor*). This is the common swan of Europe, where it has been kept and bred in a semidomestic condition for centuries. In England the feudal laws concerning the ownership and rearing of these birds are still observed to some extent.

The Mute Swan is a large bird, readily distinguished by the reddish beak and black tubercle at the base. The male

is larger than the female, and generally has the tubercle better developed. The feet of the common form are black, but in a variety known as the Polish Swan, which appears to have arisen by mutation, the feet are leaden gray. The young of this bird are white when hatched, while those of the typical Mute Swan are sooty gray.

These birds are bred in Europe with the greatest facility, but it is only of very recent years that much success has been attained in this country. Many have explained the failure by the belief that the males were rendered sterile before leaving Europe. Whatever the difficulty, it seems to have been overcome, and Mute Swans are now being bred here in some numbers.

At Belmar, New Jersey, a flock of nine birds has been bred up to more than fifty in the last five years. The birds are kept on a large lake in the center of the town. This lake is well supplied with *Anacharis,* an aquatic plant of rank growth. The original intention was that the swans should prevent the overgrowth of this plant, which they appear to be doing with great success. The birds nest about the shores of the lake, not far removed from public highways and entirely without shelter. The scene during the breeding season is one calculated to stir the enthusiasm of the most phlegmatic nature-lover.

Male swans are exceedingly pugnacious, particularly during nesting time, and will not tolerate the presence of a rival or another pair in the immediate vicinity. Even a man must be on his guard when near the nest, for a blow of the wing of a swan is not to be taken lightly.

The nest is built of sticks and rubbish and is a structure of considerable size. The eggs number from three to seven, and are greenish-white in color. Incubation occupies six weeks, and the young of the typical form, as already mentioned, are sooty gray. If plenty of green food is avail-

able, the young will be reared by the parents with little difficulty. The ration may be eked out with bread crusts and game food.

The sooty cygnets are of a similar color when feathers are assumed, but the young of the Polish form are white in the first plumage, as in the down. They are ready for breeding when two years old.

America has two fine native species of swans, the WHISTLING (*O. columbianus*) and the TRUMPETER (*B. buccinator*). Both are distinguished from all other white swans by their black beaks, and from each other chiefly by the larger size of the Trumpeter and a yellow spot at the base of the beak of the Whistler. The Trumpeter, unfortunately, now is nearly extinct, and probably is so far reduced that it cannot be resuscitated by propagation in confinement. Both species have been bred in captivity.

The BEWICK SWAN (*O. bewicki*) and the WHOOPING SWAN (*O. cygnus*) are European species. They are very similar in appearance, the latter being distinguished by its considerably larger size and the greater extent of the yellow at the base of the bill, which runs down past the nostrils in this species, but stops short of them in the Bewick. Both species are occasionally offered for sale. They are hardy and desirable, but are difficult to breed.

The BLACK-NECKED SWAN (*O. melanocorphus*), of southern South America, is the only species which appears to be delicate in captivity. In Europe it presents no particular difficulties and breeds readily and frequently. In America, however, it is very difficult to establish. Once acclimatized, it is as resistant as any other, and lives well enough. An abundance of green food is absolutely essential for keeping this species in health. With its snowy body, black neck and red beak, it is the handsomest of the swans, and it is regrettable that it is not more easily kept.

In color, at least, the Black Swan (*Chenopsis atrata*) is contrary to all tradition, and its discovery in Australia, in 1697, must have been a sad blow to lovers of proverbs. Its somber, brownish-black plumage, set off with a coral beak, is attractive, and in grace it far excels any of the other species. The primary feathers are white and the wing coverts are curiously curled.

This swan is a very free breeder, the greatest trouble lying in the fact that the birds fail to change their calendar when introduced into the Northern Hemisphere, and are as likely to nest in January as any other time. They are the best of parents, however, and frequently rear the cygnets in spite of the greatest difficulties.

## CHAPTER IX

## PARROTS

After the canary, the members of the various groups of the order of parrots (Psittaciformes) are kept as pets more frequently than any other birds. The faculty of imitating the human voice, which most parrots possess in some degree, exercises a fascination which few can resist. That they are, in the main, extraordinarily hardy birds is evidenced by the frequency with which, in spite of all manner of dietary abuse, they are seen in captivity. There are records of parrots living in confinement for periods up to ninety-odd years. Twenty-five to thirty-five years may be considered as a fair average longevity.

Three families are represented by the species which may be considered as suitable for cage birds: Lories (Loriidæ), Cockatoos (Cacatuidæ) and that which includes the Macaws, Parrakeets, Amazon and Gray Parrots and Lovebirds (Psittacidæ). As food and treatment vary considerably in each case, each group will be considered separately.

### Lories and Lorikeets

These birds, while the loveliest of parrots, are, unfortunately, likewise the most delicate. Their tongues are finely divided and brush-like at the tip, as an adaptation to their habit of feeding on the pollen of flowers. Their beaks, while less powerful than those of other parrots, are still strong enough to crush small seeds, or, if necessary, to inflict very severe bites.

Lories quickly become delightfully tame, and are ex-

ceedingly playful, performing antics much like those of a happy kitten. They will live in an ordinary parrot cage, but do best in a roomy aviary where their sportive instincts may be given full play. Like most parrots, they nest in hollow trees, and if suitable boxes and logs are provided, may occasionally lay eggs and rear their young, but success is not common. Although all of the species come from the East Indies, Australia or New Guinea, many are able to live through the coldest winters in unheated aviaries.

Lories occasionally learn to speak a few simple words, but cannot be considered good talkers.

One of the greatest drawbacks to the keeping of lories is the fact that dealers almost invariably feed them on seed only. Many species will thrive for a time on this ill-considered diet, but death from fits is certain to follow, sooner or later. When birds thus fed are received, they must be brought gradually to eat suitable food, for after having had seed for a long period, they frequently are reluctant to change.

The staple food of lories and lorikeets should be one of the various forms of "milksop." The mixture is best made with sweetened condensed milk, diluted with boiling water, as the keeping qualities of this preparation excel those of fresh milk. The milk, while hot, should be poured over biscuit or sponge-cake known to be free from harmful ingredients. In the New York Zoölogical Park, whole-wheat zweiback is used with very satisfactory results. Soft, ripe fruit, such as bananas, pears and grapes, as well as stewed apples and pears, should be furnished daily, as well as fresh green food when obtainable. Most species will eat a small amount of seed, preferably canary, millet or oats. Lories enjoy bathing, and water should always be available.

The tails of the lories proper are comparatively broad and

rounded at the ends; those of the lorikeets are long and sharp-pointed. Of the former, the CHATTERING LORY (*Lorius garrulus*) and the YELLOW-BACKED (*L. flavopalliatus*) are most commonly seen. Both are, in the main, deep red with green wings. The latter has a yellow patch in the center of the back. The PURPLE-CAPPED LORY (*L. domicella*) is somewhat similar, but has the head black, shading to purple on the nape, and a yellow pectoral band.

The lorikeet most abundant in captivity is the BLUE MOUNTAIN or SWAINSON'S (*Trichoglossus novæ-hollandiæ*), which frequently reaches this country in large lots. The birds invariably arrive in perfect condition, but drop off alarmingly if kept on the seed diet. It is a beautiful species, green above, with head and abdomen blue, a yellow band on the nape and a wide zone of reddish-orange across the breast. There are a number of similar, closely related birds, the best known of which is the RED-COLLARED LORIKEET (*T. rubritorques*), easily distinguished by the deep orange nuchal band.

The SCALY-BREASTED LORIKEET (*Psitteuteles chlorolepidotus*) is one of the most satisfactory species in captivity. It will live for a long time on seed and fruit alone, although, of course, a liquid diet suits it much better. It is less ornate than most, being green above, with the breast feathers yellow edged with green; the under wing coverts are red.

### Cockatoos

The cockatoos are a fairly homogenous group, easily distinguished at a glance from other parrots. All of the species are crested, and the beak is usually thick and deep. White plumage is very prevalent among them, and solid black, an unusual color among parrots, is found as well.

Their range is much the same as that of the lories.

Many of the species are absolutely hardy and can withstand the lowest temperatures with little or no shelter. This is especially true of the Sulphur-crested, Roseate, Slender-billed and Bare-eyed Cockatoos, and the Cockateel.

Hand-reared cockatoos make excellent pets, but usually have a most annoying habit of screaming loudly and harshly. They often pick up a few words, and some individuals make very fair talkers. It is of interest to note that the sexes of many species of cockatoos may be distinguished by the color of the iris, which is dark in males and light reddish in females.

Although, being short-tailed, cockatoos will keep in very good condition in a roomy cage, the larger species are much better off on stands. If given the privilege of space, they will derive much benefit, and occasion some amusement to the owner as well, by their clownish antics—throwing up the crest, spreading the wings and swinging inverted from the perch.

Cockatoos should be given a mixture of sunflower and hemp seeds, oats, wheat, dari and a little canary, the ingredients being varied as opportunity permits. Peanuts are welcome and beneficial, as well as ripe fruit, green food, peas in the pod, green corn and an occasional dry biscuit. Thoroughly boiled whole corn is relished by all parrots as a tidbit and is an excellent diet for a bird that is out of sorts. It must not be used too extensively for healthy adult birds, as it is very fattening in character. Pure water only should be provided for drinking and bathing. Aside from these items, nothing should be given to cockatoos or parrots. Meat, bones, tea, coffee, candy, cake, etc., should be especially avoided. Indulgence in such matters is the basis for most of the troubles to which captive parrots are subject.

The Sulphur-crested Cockatoo (*Cacatua galerita*), of

Australia and Tasmania, is the best known species. It is white in plumage, with a long, narrow, yellow crest, and a tinge of the same shade in the tail feathers. Great quantities of adult birds are netted in Australia, and these form the bulk of the shipments which reach this country. Such birds are exceedingly wild and intractable, and become tame only after the most persistent efforts on the part of the owner. Young, hand-reared birds occasionally are seen, and such specimens should be sought for.

The Red-crested Cockatoo (*C. moluccensis*), of Ceram, is the finest of all. It is a large bird, rose-tinted white in color, with the longer feathers of the full crest bright vermilion. It is not common in captivity, but the few specimens seen are invariably hand-reared and enchantingly tame.

The Great White Cockatoo (*C. alba*) is similar to the foregoing, but is slightly smaller and white in color, with the exception of an infusion of yellow in the wings and tail. The crest is longer than in the Red-crested. It is a native of the Molucca Islands.

The Leadbeater Cockatoo (*C. leadbeateri*) is an Australian bird. It is exceedingly handsome, being white above, with the head, neck and underparts strongly suffused with rosy pink. The crest is white at the tip and reddish at the base, with an intermediate band of yellow. When thrown up in display, the effect is very attractive.

The Roseate or "Rosa" Cockatoo (*C. roseicapilla*) is the only common species which is not white in the main. It is a really lovely bird, pale gray above with the crown pinkish-white, while the neck, breast and underparts are deep rose. It is very abundant in Australia, where it is known as the Galah, and is shipped in large numbers by the catchers. Specimens offered by dealers are invariably very wild and are difficult to tame. Although it is one of the poorest

speakers among the cockatoos, it is sometimes sold by the unscrupulous as a "gray parrot."

The Cockateel (*Calopsittacus novæ-hollandiæ*) is to the cockatoos as the parrakeets are to the parrots proper. Both sexes are ashy gray above, with white wing patch. The cock has the crest and face bright yellow, with an orange cheek patch; these markings are much duller in the female. It is a pretty, hardy bird, and individuals reared from the nest occasionally learn to speak a few words. It breeds freely if given its liberty in an aviary, nesting in prepared logs or other artificial receptacles.

### Macaws

The macaws are the largest, and perhaps the gaudiest of the parrot tribe. Certainly they are the noisiest, the softest sound of which they are capable being a harsh rumble, and their loudest terrific beyond description. The writer has seen wild macaws on early tropic mornings, with their brilliant plumage reflecting the first rays of the sun across the treetops. Under such conditions, as they flew along the silent waterways, their notes had decided charm. But within the confines of a room the shriek of a macaw is not a pleasant sound.

Because of their long tails and their incurable habit of climbing wires, macaws are best kept on stands or on swinging perches. A light, strong steel band around one leg with a short chain, attached to a swivel and a sliding ring, are all that need confine the bird. These attachments, as well as the receptacles for food and water, must be strong and securely fastened, to withstand the persistent attacks of the powerful beak.

Macaws should be fed as recommended for cockatoos.

Most of the macaws which reach us have been reared

from the nest by natives. These birds are reasonably tame, and often make fair talkers. Macaws are seldom to be trusted, however, and their strong, heavy beaks are dangerous weapons.

There are about twenty species of macaws, of which only a few are generally seen in captivity.

The Red and Blue Macaw (*Ara macao*) and the Blue and Yellow (*A. ararauna*) are the most common. The former is bright red in color, with green-tipped, yellow wing coverts and blue primaries. The latter is deep blue above, with bright yellow underparts. Both species are found from Central America to northern South America.

The Green-winged Macaw (*A. chloroptera*) somewhat resembles the Red and Blue, but is considerably larger, with a heavier beak. It is a darker red, and has no yellow in the wing coverts, which are mostly green. Its range approximates that of the preceding.

The Military Macaw (*A. militaris*) is mostly bright green, with a red frontal patch. It is somewhat smaller than those already mentioned and is less common. It is found from Mexico to Peru.

The most charming of all macaws are the blue species, of the genus *Anodorhynchus*. There are three forms, of which the least uncommon, as well as the finest, is the Hyacinthine (*A. hyacinthinus*). This is a huge creature, nearly three feet in length, with a great hooked beak and of a deep cobalt blue, with the base of the lower mandible as well as the eye-rings yellow. This is an intelligent bird, very tame and confiding with those it knows and trusts, but decidedly averse to strangers. All of the species have rather obscure origins in central Brazil, and consequently are always rare and high in price.

Green-winged Macaw (above)
Lesser Sulphur-crested Cockatoo (below)

## Parrots

Of the parrots proper, there are something over one hundred species, found in Mexico, Central and South America, the United States, Africa and Madagascar. Although brilliant coloration is not the rule, it is among these birds that the finest talkers occur.

Parrots are usually kept caged, close confinement apparently not in the least affecting their health. The cage should be roomy enough to permit some exercise. The largest and strongest cages are usually those made of brass, but the danger of poisoning from corrosion is always present. For this reason, if for no other, tinned or galvanized wire is preferable. As many perches as the size of the cage will permit may be used. Many birds have a habit of chewing the perches, which may be lessened to some extent by providing bits of soft wood for the working off of energy.

Food and water receptacles generally are made removable from without, a fortunate provision when the inmate must be cared for by a timid or unfamiliar person.

A removable tray, which should be kept covered with clean sand or fine gravel, facilitates the removal of refuse. Parrots swallow a considerable number of small stones, which are required for proper digestion of the food.

The food of adult parrots should be much the same as that recommended for cockatoos. It is customary in this country to feed parrots very heavily on sunflower and hemp. It should be borne in mind, however, that both these seeds, particularly the latter, have a very heating and fattening effect. They should by all means be strongly diluted with oats, dari and canary seeds. Nuts, ripe fruits and green food may be supplied freely. As already stated, tea, coffee, meat, sweets, etc., must never be given.

Few parrots will bathe, but should be allowed to if they will. Otherwise the plumage should occasionally be sprayed with tepid water.

There is a curious superstition existent among parrot-keepers, to the effect that these birds not only require no water, but are better off without it. The foundation for this absurd belief is not hard to find. When parrots, particularly young birds, are being brought from the tropics, they are customarily fed on boiled corn or bread and milk. What moisture they require is obtained from the food. If such birds are suddenly given access to unlimited water, the effect on the digestive organs is dangerous, and may result in the death of the bird. On the other hand, if the parrot be given a drink daily, and then the water be removed for a short period, the bird will gradually become accustomed to it. Once this is accomplished, there is nothing to fear from clean water.

Parrots of two types of disposition are seen in the New York bird market. There are wild, vicious individuals, caught while adult and almost untamable. Such birds should be avoided, no matter how low the price may be. The majority of arrivals, however, are young, tame, hand-reared birds, very gentle and affectionate. A bird of this sort makes an interesting, clever pet, and if it is of one of the better-talking species, will learn quickly.

These young parrots, as already stated, generally are brought to New York on softened food. It is necessary, therefore, to continue this diet for a time, bringing the bird to hard seed little by little. The same course is necessary with the drinking water.

Teaching a parrot to talk is not the difficult matter it commonly is supposed to be. If the bird is young and tame, it will learn very quickly. It should be confined by itself, beyond the sight and sound of others, and its cage some-

what darkened. Under such conditions, it will not be long in learning oft-repeated sounds. Short, simple words should be taken first, and the same one reiterated, until it has been thoroughly mastered by the bird, before another is taken up. The art of learning is acquired as the parrot grows older, so that accomplished birds are able to repeat fairly long sentences with very little instruction. In training a parrot one must not forget that one will have to endure the constant repetition of whatever the bird is taught. Reflection on this point may have some effect on the selection of phrases, and the usual banal remarks of parrots may be avoided.

While it is not at all uncommon for a cherished family pet suddenly to astound its owners by producing an egg, it is most unusual for these birds to breed in captivity. In fact, while the Gray Parrot has been bred, there seems to be no record of this event in the case of any Amazon. Parrots nest normally in hollow logs, and there is no reason to doubt that, in a large aviary suitably fitted up, the feat might be accomplished.

The Gray Parrot (*Psittacus erythacus*), of western and central Africa, is the parrot *par excellence*. It is attractively colored—soft gray with red tail—and quickly becomes an accomplished talker. It is also a clever mimic, and excels other parrots as a whistler.

Individuals with red feathers scattered through the plumage occasionally are seen. Such birds are known as "kings" and are credited with a superior degree of intelligence which is, of course, purely mythical. It appears to be less hardy than Amazons when it comes to enduring dietary abuse, and wrong feeding will quickly upset it. Although it is imported in considerable numbers, the mortality is generally very high among freshly arrived birds, many being infected with psittacosis. Severe losses are be-

ginning to discourage dealers, so that importations of these birds are yearly becoming less.

Unlike most parrots, the Gray is not difficult to sex. The female is generally smaller than the male, and the bare patch around the eye is rounded posteriorly in the former, but ends in a point in the sterner sex.

Of the green Amazon Parrots, there are about forty-five known forms, but few of which are usually to be had from dealers. All of the common species are mostly green, with wings and tails variously marked with red, blue and yellow. It is the markings of the head, however, that are most characteristic, and as the following descriptions are for the purpose of identification only, we shall confine them to those parts.

The YELLOW-HEADED AMAZON, or "DOUBLE YELLOW-HEAD" (*Amazona oratrix*), of Mexico, is the most popular species. As implied by the name, the green plumage is enlivened by a head of pale yellow. The beak is white. The yellow is less extensive in young birds, covering a greater expanse as the parrot becomes adult. Parrots of this species become excellent talkers and also learn songs, their voices being particularly adapted to this form of vocal expression.

The YELLOW-FRONTED AMAZON, or "SINGLE YELLOW-HEAD" (*A. ochrocephala*), is somewhat smaller than the preceding, and has the yellow confined to the forehead only. The bill is blackish when adult, with base of the upper mandible fleshy-colored. It is found in northern South America. It is commonly imported, and makes a very good talker. The PANAMA AMAZON (*A. panamensis*) is very similar, but has the bill white throughout. These species often are not distinguished in the trade.

The GOLDEN-NAPED AMAZON (*A. auripalliata*) ranges from western Mexico to Costa Rica. It is a large bird, with a yellow patch on the nape, which is wanting in im-

mature specimens. The Golden-nape is a clever pupil, and pushes the Yellow-head closely in the question of superiority. This species is now imported more frequently than in former years.

The Blue-fronted Amazon (*A. æstiva*) is green, like its congeners, with blue forehead and yellow face and throat, while the wings and tail are further diversified with red and blue. It is found from central Brazil to Argentina. This is a handsome, hardy species, very abundant in the New York market, but as a linguist not supposed to rank with the foregoing forms.

The White-fronted or Cuban Amazon (*A. leucocephala*) was at one time the commonest parrot among dealers. Recently, however, its exportation from Cuba has been prohibited, so that is becoming uncommon. Some individuals make fairly good speakers, but the species cannot be considered as one of the best. Like most Amazons, it is green in general, with a white forehead, bordered on the crown with red, which extends to the cheeks and throat.

The Green-cheeked Amazon (*A. viridigena*), a Mexican species, was once so uncommon here as to be a rarity. Of late, however, it has been imported more freely, at times being the most abundant parrot in the market. Linguistically, it is one of the least gifted, and has not become popular. It is smaller than most Amazons and mostly green in color, with the cheeks of a brighter shade and the forepart of the head red.

### Parrakeets and Love-birds

The parrakeets are included in a number of subfamilies, differing from each other sufficiently for a bird to be assigned on sight, even though its species may not be recog-

nized. There are three important groups: the Broad-tails and Grass Parrakeets of the Australian region, the Ringnecks and allied species and the American forms. The characters which distinguish parrakeets from parrots are more or less arbitrary, but the possession of a long tail, whether pointed or rounded, is the most prominent character.

The American Conures and Parrakeets (CONURINÆ) make good cage birds, as most of the specimens which reach us are hand-reared and tame. It is not uncommon for them to learn to speak a few words.

The cage should be of metal and large enough to provide room for the inmates. A number of the species have reared their young in captivity, but they must have the run of an aviary for this purpose. They nest in hollow logs, as do other birds of this order.

The food should consist principally of oats, canary and millet, with the addition of a small quantity of sunflower and hemp. Green food and fruit should be furnished, as well as water for drinking and bathing, a privilege of which many parrakeets will avail themselves.

The best known species are the Conures (*Conurus*), of which about thirty forms are known. All are characterized by the possession of long, pointed tails. Many are uncommon or rare, only a very few being abundant in the market here.

Three closely allied species are seen in about equal portions, and divide the honors of popularity. These are the AZTEC CONURE (*C. azteca*), of Central America, the CACTUS CONURE (*C. cactorum*), of southeast Brazil, and the BROWN-THROATED CONURE (*C. æruginosus*), of northern South America. All are green above, with brown faces and throats. The Aztec and Brown-throated are very similar, but easily distinguished by the yellow ring around the

eye of the latter. The Cactus has the brown throat of a paler and softer shade and the underparts pale yellow. These are among the smallest of the conures, measuring about eight or nine inches. All make ideal pets, being hardy, tame, affectionate and amusing.

The Golden-crowned Conure (*C. aureus*), of South America, is occasionally imported in some numbers. It is a larger bird than the foregoing, green, with forehead and eye-ring orange and the breast olive. It is a handsome species and lives well, but most of those seen here are wild-caught and do not readily become tame.

The Black-headed Conure (*C. nanday*), of Paraguay, has always been a rare bird in this country. During the past two or three years, however, there have been heavier importations of this species, so that it is now more often to be obtained. It is a large bird, reaching a length of twelve inches. It is green above, with brownish-black head. The lower throat and much of the wing is blue, while the thighs are red. Most of the birds offered here are wild-caught adults, but tame individuals are sometimes seen, which make charming pets.

There are many other handsome members of this group, but none is obtainable with a frequency sufficient to warrant its inclusion here.

The Tovi Parrakeet or "Beebee" (*Brotogerys jugularis*), of Mexico and Central America, is imported in greater numbers than is any other American parrakeet. It is a small bird, not much over six inches in length, mostly dark green, with a small orange spot on the chin. When thoroughly tame, as most specimens quickly become, it is a delightful pet. Although a pair will live together in friendly fashion, and evince every evidence of willingness to breed, there is no authentic record of this feat having been accomplished.

The Blue-winged or Passerine Parrotlet (*Psittacula passerina*), a native of Brazil, is among the smallest of the parrot family, not exceeding five inches in length, including the stumpy tail. The male is bright green, with the rump and much of the wing bright blue, the latter color being lacking in the female. Because of the affectionate nature of mated pairs, this bird has come to be known as a love-bird, although it is not closely related to those birds, which occur only in Africa, and have rounded instead of pointed tail feathers. These tiny creatures frequently become very tame, and are not at all difficult to breed, even in a small cage, if a suitable box or husk is provided. The chief food should be canary, millet and oats.

The Gray-breasted or Quaker Parrakeet (*Myopsittacus monachus*), of southern South America, is the only bird of the parrot tribe which actually constructs its own nest. The true love-birds carry bits of bark and other soft material for lining their chosen cavity, but the Gray-breasted builds itself a huge, strongly constructed domed nest, of stout twigs, carefully interwoven. This bird is about a foot in length and light green in color, with the face and breast soft gray. It is often to be had, and has been bred in this country by at least one aviculturist.

The Ring-necked Parrakeets and their allies (Palæornithidæ) are confined to the Old World. As a group they are not noted for their talking abilities, but the true Ring-necks often are talented speakers, and have a special bent for performing tricks. These birds are freer breeders than conures, and many species have been bred in captivity. Their feeding and general care do not differ from that described for the preceding group.

The Ring-necked Parrakeets (*Palæornis*) include about twenty-five species, their center of distribution lying in southern Asia. The best known species is the Indian

Green-cheeked Amazon Parrot

Gray Parrot

Ring-necked Parrakeet (*P. torquata*). It is about sixteen inches long, including the narrow, tapering tail. The male is green in general, with a rosy collar on the hind neck, each extremity meeting a black band which passes backward from the base of the lower mandible. A second black band joins the eye and nostril. The female is somewhat smaller and lacks the head markings. This is a freely imported species, and frequently learns to speak. It is easily bred, if given an aviary of good size.

The Indian Ring or Alexandrine Parrakeet (*P. nepalensis*) is the giant of the genus, measuring about twenty inches. Its markings are very similar to those of the preceding species, with the addition of a large, rosy patch on the wing coverts. This, or one of three other closely allied forms, is believed to be the bird brought to Europe by Alexander the Great, in the third century, B.C.

The Banded Parrakeet (*P. fasciata*) has a wide range in southern and central Asia. It is mostly green, with gray head, vinaceous chest and yellowish-green wing patches. It has the black cheek and face stripes of the foregoing species, but the nuchal collar is green instead of rosy in the male. The upper mandible is red and the lower black, but the entire beak is black in the female. This bird is commonly confused with the very similar Javan Parrakeet (*P. alexandri*), which is distinguished by having both mandibles red, in both male and female.

Neither of these birds is active or intelligent in captivity, and in this country both seem difficult to acclimatize.

The Blossom-headed Parrakeet (*P. cyanocephala*) is found in India and Ceylon. The male is of the usual green shade, with black mandibular stripes. The entire head is a rich plum red, and there is a small red mark on the wing coverts. The female is smaller and duller and lacks the red wing patch. Although not imported as frequently as

some, this bird is not uncommon here. Like most of its congeners, it is hardy and long-lived.

The KING PARRAKEET (*Aprosmictus cyanopygius*), of Australia, although not at all a common bird, still is to be had occasionally. For dazzling beauty, coupled with extreme longevity, it has hardly an equal among parrakeets. The adult male has the upper parts green, with the wings deep blue, while the entire head, neck and underparts are brilliant scarlet. The female has the red confined to the abdomen and sides. This is a quiet, phlegmatic bird, much given to sedentary habits. In spite of the lack of exercise, however, it has a never-failing appetite, the gratification of which does not seem to have the ill effect on the digestive system common to inactive birds.

Of the true love-birds (*Agapornis*), there are ten known species, all found in Africa or the neighboring islands. Because of the inaccessibility of the habitat of most of the forms, only five species have reached the hands of aviculturists, and one, the Abyssinian (*A. taranta*), is so rare as to be negligible. A short, black-banded tail, consisting of feathers with rounded tips, characterizes all of the species. They are thus easily distinguished from the New World Parrotlets and the Australian Grass Parrakeets or Budgerigars, which are commonly miscalled love-birds.

Mated birds exhibit the strongest affection for each other, which has given rise to their popular name. It is not true, of course, that in case of the death of one the mate will pine and die. But this legend is often given strength by the fact that the cause which brought about the death of one bird is very likely to have a similar effect on the survivor.

Love-birds are commonly kept as cage birds, and once acclimated, most species live very well. In an aviary, however, they are at their best, since most individuals are too wild for cage life.

The Gray-headed and Black-cheeked, at least, are free breeders, the best receptacle being a box about 6″ x 8″, with a suitable entrance hole. Besides the Gray-breasted Parrakeet, the love-birds are the only parrots known to carry nesting material. In this case the lining only is provided. The favorite material is the bark of fresh twigs, which is shredded off and carried to the nest, tucked among the upper tail coverts.

Love-birds may be fed on the usual small seeds, with plenty of green food.

The Gray-headed and Black-cheeked are perfectly hardy, and entirely unaffected by cold, if given shelter from wind and storms.

The commonest species is the Gray-headed or Madagascar Love-bird (*A. cana*). This bird is a native of Madagascar, but has been introduced to neighboring islands. The cock is green, with gray head, the latter color being lacking in his mate. This bird is imported in considerable numbers and is one of the commonest of cage birds.

Before April, 1908, the Black-cheeked Love-bird (*A. nigrigenis*) was unknown in captivity, and the five birds which arrived then caused a sensation. The situation, however, was quickly altered, for in January, 1909, great quantities were received in London. Since then this bird has become very popular because of its handsome appearance and the readiness with which it breeds. It is green in the main, with brown crown, brownish-black cheeks, orange throat and red bill. There seems to be no reliable index of the sexes.

The Red-faced Love-bird (*A. pullaria*), of West Africa, although once a very common cage bird, is now seen with increasing infrequency. It is less hardy than the other species, inclined to be nervous if closely caged, and is a very shy breeder.

The Peach- or Rosy-faced Love-bird (*A. roseicollis*), of South Africa, is considerably larger than the foregoing. It has never been a common bird, but quite recently there have been fairly numerous arrivals. It is a beautiful bird, soft green above, with red forehead and rosy cheeks and breast. The rump is bright blue and the tail variegated with red, green, black and blue. In the female the color on the breast is less extended.

The Broad-tailed Parrakeets and their allies (Platycercinæ) include many beautiful species, the majority of which, although common enough in Europe, are seldom seen here. The subfamily is confined to the Australian region.

Although most of these birds will become tame if caged, and some even make very good pets, they are much better off in a capacious aviary, where their active habits may be given full sway. Under such conditions, many of the species are free breeders, but each pair must be separately confined. Nesting logs or boxes of good size should be provided. Most Broad-tails are absolutely hardy, being able to endure the coldest weather if provided with some shelter. Their feeding does not differ from that of other parrakeets.

The Broad-tails proper form the genus *Platycercus,* including some sixteen species, all found in Australia. They are characterized by having the feathers of the back black-centered, giving a scaly appearance, and all have a long, wide tail.

The Rosella Parrakeet (*P. eximius*) is the best known species. The head and breast are red, with white cheek patches; the black back feathers have broad, yellow-green borders, while the wing coverts are blue. The tail feathers are blue, green and white. As in its congeners, the sexes are similar, but distinguishable by the smaller head and

beak of the female. This bird is imported freely, and, once established, is very long-lived.

The Pale-headed or Mealy Rosella (*P. pallidiceps*) has much the same pattern as the preceding, but the red of the head and breast is replaced by yellow, which color also borders the feathers of the back. It is not so commonly seen as its relatives, but is often to be had.

The Pennant Parrakeet (*P. elegans*) is a really lovely bird. It is bright red in general, with blue cheek patches and wing coverts; the feathers of the back are black with crimson edges and the tail is blue. The plumage of the young birds is greenish, with the blue cheeks and wing coverts, the red appearing in patches. This beautiful species is perfectly hardy, and indifferent to cold once established. Unfortunately, a great percentage of the birds received here are infected with psittacosis, or badly infested with worms in the digestive tract, which makes their acclimatization a difficult matter.

The only remaining member of this subfamily which reaches us in sufficient numbers to be regularly obtainable is the Undulated Grass Parrakeet, or Budgerigar (*Melopsittacus undulatus*), the "Shell Parrakeet" of dealers. This little bird has become thoroughly domesticated and is bred in great numbers. It is one of the most common of cage birds and frequently is miscalled love-bird.

The typical form is green, the feathers of the upper parts being narrowly tipped with black. The forehead, cheeks and throat are yellow, with a short band of blue and three round, black dots on each cheek. The tail is long and narrow and blue in color. The sexes are similar, but may be known by the blue nostril and ceres of the male, as compared with the brown ones of the female. Continued breeding in captivity has produced a yellow variety which, when properly colored, is a very handsome bird. It is now almost

as common as the green form. Some twenty-five or thirty years ago a blue variety appeared, but quickly died out. In November, 1910, three birds of this color were exhibited at a bird show in London by a Belgian aviculturist, who is stated to have secured them in France. For a few years following the reappearance of the lost variety a great effort was made to perpetuate it. Despite all, however, it has gradually decreased in numbers, and seems to be about to disappear for the second time.

The three color phases of the Grass Parrakeet are particularly interesting because of the splitting up of the typical green into its components, blue and yellow.

The Grass Parrakeet is a hardy species, being indifferent to cold if well sheltered. It breeds freely, often in the confines of a cage. If turned into a fair-sized aviary, young birds in considerable numbers may be expected. Several pairs will breed together in perfect equanimity, if there are a sufficient number of nesting boxes. There should be about six inches in each dimension, with an entrance hole about one and one-half inches in diameter in one side, near the top. A perch should be attached outside, and the bottom of the box must be slightly scooped out, to keep the eggs together, as these birds carry no nesting material.

The food of Grass Parrakeets should be simple. Oats, canary and millet are best, and should be supplemented with plenty of green food, particularly when young are in the nests.

# CHAPTER X

## CAGE BIRDS

Most of the families of the order of perching or passerine birds (Passeriformes) include some species which are suitable for cage or aviary, and it is here that the majority of the desirable ones are found. The great majority belong to the Finches, Weavers and Waxbills, Thrushes, Tanagers, Mynas or Jays, but there are few groups which are not represented. The families mentioned combine propinquity and hardiness, these two factors easily accounting for their popularity. Numerous others would rank with them if the habitats of their members were more accessible, for many birds which live well in captivity are very difficult to obtain. A notable example is that of the Larks. The Skylark and the Wood-lark are the only species common in captivity in this country, although there are a great many species which, if they could be obtained, no doubt would be equally long-lived. The progress of avicultural methods is rapidly developing methods of treatment which permit the keeping of many birds formerly considered impossible, and new species are being introduced yearly.

In the following pages space will permit the consideration of the most usual cage birds only. If others should, by chance, come into the hands of the amateur, their care usually may be deduced from that recommended for similar species.

### Bulbuls

The Bulbuls (Pycnontidæ) are active, noisy birds, with some powers of song. There are nearly three hundred

species, widely distributed in Asia, the East Indies and Africa. In captivity they are uncommonly hardy and long-lived. If kept in individual cages these should be roomy and must be cleaned frequently. As already stated, the box-type cage is most suitable for the bulbuls, as well as for other cage birds. These birds thrive best in an aviary of good size, but are not to be trusted with smaller or weaker species. Mated pairs are especially likely to be quarrelsome. Bulbuls belong to the "soft-bill" group, and should be fed on soft food and fruit, which must be supplied daily. Most species are fond of live food and should have a few 'meal worms or other insects daily.

A comparatively small number of the known species are common in captivity. The one most frequently seen is the White-eared Bulbul (*Otocompsa leucotis*), of Persia and India. It is earthy-brown above, with black head and white cheeks and ears, the lower parts are whitish and the under tail coverts yellow. This is said to be the bulbul of poetry, and some individuals are excellent singers, though many confine their vocal efforts to an oft-repeated call-note.

The Red-eared Bulbul (*O. jocosa*) ranges from north-eastern India to China. It is somewhat similar to the preceding, but has a pronounced crest. The white ear-patches are smaller and bordered above by a narrow tuft of red. It is thus a considerably handsomer bird than the White-eared, but its powers of song are not great.

The Green Bulbuls (*Chloropsis*) differ greatly from the more typical species in both habits and appearance. From their feeding methods, they are frequently known as fruit-suckers. They are lovely birds, in every way suited for cage life, being brightly colored, gracefully shaped and gifted with some powers of song and vocal imitation. They live well and quickly become very tame and confiding. Their

only unhappy trait is quarrelsomeness. They are usually quite safe, however, in a mixed lot of birds of their own size, toward which they seldom exhibit pugnacity. Two cocks, however, and sometimes even a pair, cannot be placed together, as they will fight to the death.

Green Bulbuls are chiefly frugivorous in habit and should be fed on soft food, with an abundant supply of such fruit as bananas, oranges, grapes, pears, etc. Insects should be furnished as freely as possible.

The only species generally obtainable is the Golden-fronted Green Bulbul (*Chloropsis aurifrons*), of the sub-Himalayan region. It is bright green in color, with blue shoulders. The forehead is rich orange and the cheeks and throat are covered by a black patch centered with blue, which extends to the beak.

### Babblers

The Babblers and Jay-thrushes (Timeliidæ) form a heterogeneous family of more than six hundred species, found chiefly in Asia and more sparsely in Africa and the Australian region. The members of this group are exceedingly diverse in appearance, but have at least one trait in common—great longevity in captivity. The number of species regularly kept by dealers is limited, although some are very common.

The Jay-thrushes, or Laughing Jays, are large birds, and some are very handsomely marked. Many are hardy and able to endure low temperatures if well sheltered. They are too active for cage life, and should be kept in a roomy aviary. Although not inclined to pugnacity among themselves, they may not safely be kept with smaller species. There is a curious habit of tickling among most of the birds of this group, two birds, often of the same sex, sitting side

by side and preening the feathers of the head and neck, to the evident enjoyment of the recipient of the attention. This habit is very manifest among the Jay-thrushes and often takes a pernicious form, many birds becoming habitual feather-pullers, and keeping the necks of their cage-mates bare of feathers.

Jay-thrushes are almost omnivorous, and thrive on soft food, fruit, insects and chopped meat. The larger species will relish a mouse or young sparrow.

The White-headed Jay-thrush (*Garrulax leucocephalus*), a native of the Himalayas, is the handsomest species, as well as one of the best known. It is dark brown in general, with a head, neck and full crest pure white, with the exception of a black band through the eye. It reaches a length of nine or ten inches.

The White-throated Jay-thrush (*G. albogularis*), also of the Himalayas, is more abundant in the market than the foregoing. It is somewhat smaller, has only the throat white and lacks the crest. This is one of the most persistent of feather-pullers, and it is almost impossible to keep two birds together, unless in a large, well-planted aviary, where there is much to distract the bird's attention.

The Melodious Jay-thrush (*Trochalopterum canorum*), otherwise known as the Spectacled Thrush and Chinese Thrush or Mocking-bird, is a native of China. It is brown in general, with a white eye-ring, extended backward in a short streak. This bird is an uncommonly fine singer, its notes being rich and sweet. Like its relatives, it is long-lived in captivity, but differs from them in its more gentle disposition.

One of the most common of "soft-billed" cage birds is the Red-billed Hill-tit (*Liothrix luteus*), variously known to dealers as Japanese Robin, Pekin Robin and Chinese Nightingale. None of these names is correct, of

course, at least as to the relationships of the bird, as it is not a thrush or nightingale. It inhabits the Himalayas, extending into southwest China. It is a small bird, not much larger than an English Sparrow, but gorgeously colored. It may be roughly described as olive green above, with yellowish forehead. The secondaries are bluish-black, with a yellow patch at the base. There is a yellow circle around the eye, running into gray on the ear coverts. The throat is rich yellow, which gradually grows fainter, the abdomen being whitish. The bill is red, sometimes with a blackish base. Males generally are brighter than females, particularly on the crown; however, this is not a constant character. A better one is the notes. These are a mere series of monotonous calls in the female, easily distinguished from the warbling song of the male, which ranks among the very best of songsters, the voice being loud, clear and varied. This species is very hardy in captivity, thus combining three attributes of the ideal cage bird—beauty, hardiness and a sweet song. It should be given soft food, fruit and insects, and if it is a mixed company it will often treat itself to a few seeds. It should not be associated in an aviary with breeding birds, as it has a bad reputation for interfering. The Hill-tit frequently builds its cup-shaped nests in captivity, but it is not often that young are reared.

### Thrushes

The Thrushes (TURDIDÆ) include not only the typical birds of this name, but a number of other forms closely allied to them. Many of our finest songsters are found here, and as most of the species thrive in captivity, it is not surprising that they are popular as cage birds. Of the more than seven hundred and fifty species, it is not possible to mention here more than a few of the best known.

The Song Thrush (*Turdus musicus*), which is found throughout northern Europe, is the only spotted-breasted thrush which is common in captivity with us. It is a large bird, not much smaller than our Robin. It is olive brown above and pale buff below, the chest being heavily marked with large, triangular spots of blackish-brown. The Song Thrush is always to be obtained from dealers, but unfortunately these birds are almost invariably wild-caught adults, which are extremely nervous and difficult to tame. Hand-reared birds are much steadier and become quite fearless. The Song Thrush is an excellent singer, its notes being very loud and clear. The cage should be of good size and not less than two feet in length. If the bird is unsteady, a cloth top is a wise precaution. The usual soft food, fruit, insects and an occasional bit of meat will meet all its dietary needs.

The European Blackbird (*Turdus merula*) is distinguished from other Old World thrushes by the black plumage and yellow beak of the male, although there are several American forms which resemble it very closely. The female is a warm brown, with the breast slightly mottled. The Blackbird is a famous songster, its notes closely resembling those of our Robin. In captivity it is more philosophic than the Song Thrush, and altogether is a much more satisfactory cage bird. Its feeding habits are similar to those of the preceding species.

The Blue Solitaire or "Clarino" (*Myadestes unicolor*) reaches New York from Mexico in considerable numbers. It is a dark-gray bird of medium size, with a white eye-ring, the plumage being very soft and thick. The Solitaire is a superb singer, perhaps the finest among birds. Its notes are clear, liquid and sustained, having a marked resemblance to silver chimes. It lives well in captivity, but of course must be protected from draughts and cold. It is of exceedingly greedy habits, and will become

monstrously fat if its diet is not carefully regulated. Soft food forms the base, but fruit is the main item, and a liberal allowance must be furnished daily if the bird is to thrive.

The Shama Thrush (*Cittocincla tricolor*) is found in India and Ceylon. It is a slender, graceful bird, with a rather small body but a long tail, which makes it appear larger. The male is shiny black above and on the chest, the rump and the tips of the outer tail feathers being white. The underparts are chestnut. The female, which is uncommon in captivity, is similar, but has the black replaced by ashy. It is an excellent singer, its song being a series of greatly varied phrases. It has also some powers of imitation. Although it is an exceedingly nervous bird, and subject to sudden panics if alarmed, it quickly becomes tame and confiding, once it has become accustomed to its surroundings. Two birds of the same sex cannot be confined together, for they are very pugnacious. Soft food, with dried flies and ants' eggs, and a good supply of meal worms, will keep the Shama in health. Some individuals will eat fruit, while others will not touch it.

The Nightingale (*Luscinia megarhyncha*) is found throughout Europe and in Asia Minor. As a songster it needs no eulogy, but the bird itself is unknown to many. It is a delicate, slender creature, somewhat larger than the English Sparrow, rich rufus above, and the breast grayish-white, sometimes tinged with brownish.

Most of the few Nightingales which reach the New York market are wild birds, caught in the autumn. Such birds rarely sing. Very occasionally hand-reared birds are offered. Such specimens are generally tame and likely to live well, but they seldom attain the full song of their species, if they sing at all. The best birds are spring migrants, caught in full song, and before mating is much progressed. They will resume their song very soon after

capture, and will continue to sing throughout several months of each year. It must be admitted, however, that a singing Nightingale is a rarity, and may be valued as such. The Nightingale is frequently troubled with sore feet. Much of this difficulty may be avoided by furnishing the cage, which should always be of the box type, with natural twigs covered with bark, rather than the usual ones of hard wood. The food must be highly insectivorous and contain an abundance of dried flies, ants' eggs, etc. Meal worms and other insects must be supplied constantly. If the bird will eat fruit, it should be furnished freely.

### Warblers

The Old World Warblers (SYLVIIDÆ) are a numerous tribe, but the only species which is common as a cage bird on this side is the BLACK-CAP WARBLER (*Sylvia atricapilla*). This is a small bird, slightly less than the English Sparrow. It is gray above and below, with the crown black in the male and rufous in the female. The male is a beautiful songster, held by many to compare favorably with the Nightingale. As a cage bird it certainly is superior to that species, for it is much easier to keep and is more likely to sing. Black-caps thrive on the usual soft food, rich in insects, with a daily allowance of meal worms. Fruit and berries are relished as well. Black-caps are inclined to over-eat, and their diet must be restricted.

### Piping Crows

The Piping Crows (*Gymnorhina*) are commonly assigned to the Shrike family (LANIIDÆ). Two species, both Australian, are known, the WHITE-BACKED (*G. hypoleuca*) and the BLACK-BACKED (G. *tibicen*), each being divided

into several subspecies. The White-backed Piping Crow is about the size of the American Crow. It is chiefly black, with the nape, back, wing coverts and base of the tail white. The bill is long, pointed and bluish-gray in color. The Black-backed is somewhat smaller, and differs in having the back black instead of white. These birds are charming whistlers, their notes having a curious, instrumental quality. Besides the natural song, they easily learn to imitate other musical sounds, and may be taught to whistle tunes. Some individuals learn to repeat simple words. Both species are perfectly hardy and require no artificial heat in winter, so long as they are properly sheltered. While some specimens will tolerate other birds in their cage, most are less liberal, and promptly attack any bird which may be introduced. Soft food, chopped meat, insects, mice and sparrows make a suitable diet for these birds.

### Larks

Although the Larks (ALAUDIDÆ) include more than two hundred species, only two may be considered common in captivity in this country. The SKYLARK (*Alauda arvensis*) is the best known. It is one of the commonest cage birds and needs no description, its mottled sandy-brown plumage and long-clawed hind toe making it easily recognized. The Skylark sings freely when caged, but it must be said that its notes are not particularly pleasing under such conditions, the more natural surroundings of distance and blue sky being accountable for much of the bird's charm. Skylarks do not perch, so such furnishings are not needed in the cage. This should be of the box type with a canvas top, to prevent injury to the lark's head in case it leaps upward. Lark cages usually are made with a semicircular projection at the front, to be floored with a piece of green sod, which

the bird enjoys picking at, and where he often stands while singing. Larks may be fed on soft food, insects, greens and an occasional pinch of seed.

The Wood-lark (*Lullula arborea*) is smaller than the Skylark, stands higher from the ground, and has distinct chestnut ear-patches which form a ready key to identification. The Wood-lark is less common in captivity than the Skylark, but still is often to be had. Unlike its terrestrial relative, the Wood-lark frequently perches, and its cage should be equipped for this purpose. This species is an excellent songster, but does not sing so freely in captivity as does the Skylark. The food of the two species is similar.

### Finches

Of the true Finches (Fringillidæ) more than one thousand species are known. Although a great diversity of form and plumage is seen among them, all possess a beak strong enough for cracking seeds, a characteristic of the broad group of "hard-bills." These birds are well suited for the attention of the budding aviculturist, as their food needs are easily supplied, no messy mixtures being required. Bright plumage and cheerful songs are also included among their charms. All things considered, it is not remarkable that by far the greater part of our cage birds belong either to this family or to the Weavers (Ploceidæ).

The food of all these birds is much the same. The base should consist of canary seed, to which may be added rape, millet, wild weed seeds, and oats, sunflower, hemp, flax and poppy or maw seed, as may seem advisable. German aviculturists commonly feed seed-eaters on a large proportion of rape, to avoid the fattening tendency of canary. However, the policy of English bird-keepers, who offer a variety of seed to offset the canary, seems more conducive

to the health and condition of the captive. A few species are better for a little soft food, and many relish insects, fruit and berries. All require green food, which should be given freely, so long as it is fresh and crisp.

Occasional specimens of many species are offered by our dealers at various times, but it is impossible to include all of them here. Nor is it feasible to attempt to enumerate them in their proper systematic order. For purposes of expediency, therefore, it seems best to consider them, for once, in the groups to which the "trade" assigns them.

As most of our birds reach us from Europe, it is not strange that the finches of that country should be imported in large numbers. Of these, the GOLDFINCH (*Carduelis carduelis*) certainly is the most brilliantly colored. It is brownish above, with bright red face and black nape, a white half collar dividing the two colors. The greater coverts and the bases of the black white-tipped flights are yellow. The tail is black and the underparts whitish tinged with brown. The female is usually smaller and duller, and has the red blaze much restricted. The Goldfinch has a wild, sweet song, which it gives freely once it has become accustomed to cage life. When first caged, it is inclined to be very wild and nervous, but quickly becomes tame. Goldfinches require a liberal supply of thistle, poppy and similar seeds, in addition to their regular diet.

The LINNET (*Acanthis cannabina*) is probably the finest singer among the European finches, its notes being particularly rich and well modulated. The adult bird is a rich brown, heavily striped with a darker shade. In the male the crown and breast are tinged with crimson, which disappears at the first molt in captivity. Young birds, which are somewhat more grayish and lack the crimson, are known as Gray Linnets. The Linnet is generally steadier as a cage bird than the Goldfinch, quickly becoming very tame. It is

particularly fond of hemp which must be fed very sparingly.

The Bullfinch (*Pyrrhula pyrrhula*) is one of the most enchanting of cage birds. It is a soft gray above, with shining black cap, wings and tail. There is a white band over the lower back. In the male the breast is a rich rose color, replaced by gray in the female. The Bullfinch is a thick-bodied, full-breasted bird, with long, soft feathers, which enhance the appearance of plumpness. Even wild-caught adults take kindly to captivity, but the most attractive ones are those which have been reared by hand. These birds are exceedingly tame, and have many quaint habits which endear them to their owner. The Bullfinch's only notes in the wild state are a clear, piping call and a curious little squeaky song, which it delivers with much gusto. It is a clever imitator, however, and young birds are easily taught to whistle simple tunes. Training Bullfinches has received much attention from the Germans, who have acquired supremacy in the art. These trained birds reach New York in some numbers each autumn and are quickly snapped up by dealers, as has already been described. In Germany they are usually fed on clear rape seed, but as they derive no harm and much pleasure from a mixed diet, it seems a pity to deprive them of it. They are fond of sunflower seed and have a mania for hemp, which must be given sparingly. All sorts of fruit and berries are relished and fresh green food should be supplied freely.

The European Siskin (*Spinus spinus*) is a perky little bird with a rather weak and not particularly pleasant song. Its body is yellowish-green streaked with black. The cap and chin are black and the breast is yellow in the male, the general color being duller and the cap missing in the female. The Siskin becomes very tame in a cage, and will learn to take dainties from its owner's fingers. Like the Goldfinch,

Song Thrush

Nightingale

it is fond of weed seeds, and these should predominate in the diet.

The Greenfinch (*Chloris chloris*) is known to American dealers as the "Green Linnet." The origin of this title is obscure, for the Greenfinch in no way resembles the Linnet. The male is somewhat larger than the English Sparrow, of a general, rich olive tint, with bright yellow on the forehead, wing, tail and breast. The female is smaller and more inclined to gray than olive. The song is an insignificant affair of three syllables. The Greenfinch should have the usual seed diet, with the addition of occasional live food.

The Chaffinch (*Fringilla cælebs*) is among the commonest of winter birds about the farms of northern Europe, and is freely imported here. The male is vinous brown in general, with gray head and nape and the wing coverts barred with black and white. The female is similar, but grayish instead of vinous in general tone. It is quiet and confident in captivity, to which it quickly becomes accustomed. The song is a cheerful but rather monotonous repetition of several notes. In addition to the usual seeds, the Chaffinch should have a pinch of soft food and occasional insects.

The Brambling (*Fringilla montifringilla*), also known as the Mountain or Bramble Finch, is closely allied to the preceding and resembles it in shape. The male has a rich chestnut breast, and the upper parts are black, each feather slightly edged with chestnut. The female is much duller in color. The Brambling has little song, but is an attractive and handsome bird. Its feeding habits are those of the Chaffinch.

The Yellowhammer or Yellow Bunting (*Emberiza citrinella*) is the best known representative of a genus which contains a great number of species that make desirable cage birds when they are to be obtained. The upper parts,

flanks and abdomen are rich brown with dark streaks, the head and upper chest being yellow. The head is somewhat variegated with dark stripes and mottlings. The female is slightly duller than the male. It thrives on a diet of seeds, but is better for a little soft food and a few insects.

The Singing Finches are a compact group, mostly African in distribution. They are closely allied to the canary, and frequently bear names which suggest this relationship.

The Green Singing Finch (*Serinus icterus*), known among dealers as "African Siskin," is considerably smaller than the common canary, but resembles it in shape. It is yellow-green above, with darker streaks, while the forehead, superciliaries, cheeks and underparts are bright yellow. There is a black mustachial streak and another through the eye. The female is smaller and less brilliantly colored. This little bird is a free singer, its notes bearing a faint resemblance to those of the canary. It breeds well in an aviary, but the cocks are very pugnacious, and will persecute other Serins if confined with them.

The Gray Singing Finch, or "Edelsinger" (*Poliospiza leucopygia*), is ashy-brown, slightly mottled above and whitish below. It is slightly smaller than the preceding and the same sexual differences exist. It is one of the finest singers among the smaller finches and is less pugnacious than the Green Singing Finch. Both species are hardy in captivity, and will live for many years under proper conditions. Their food consists of a mixture of canary, rape, millet and wild seeds, with plenty of greens.

The Saffron Finch (*Sycalis flaveola*) is the only representative of its genus well known in this country. It is very canary-like, greenish-yellow above, streaked with blackish. The forehead is bright orange and the underparts are yellow. The female is somewhat duller than the male, but otherwise is similar. The Saffron Finch is now being im-

ported from northern South America in some numbers. It is very easily kept, and breeds readily in an aviary. It is not a safe companion, however, for species smaller than itself.

The GRASSQUITS (*Tiaris*) are tiny birds, found chiefly, though not exclusively, in the West Indies. The most familiar species is the MELODIOUS GRASSQUIT (*T. canora*), of Cuba, known in England as the Cuban Finch, and among American dealers by the native name *Tomogina*. The male is green above, with the head, throat and chest black. A broad crescent of bright yellow passes across the throat, from eye to eye. The female has the black on the throat replaced by chestnut, and the yellow collar is less distinct and the breast is gray.

The YELLOW-FACED GRASSQUIT (*T. olivacea olivacea*), also of Cuba, is similar to the preceding species, but lacks the yellow crescent, this color being confined to a streak through the eye and a patch on the throat. The Mexican form (*T. o. pusilla*) is distinguished by the extension of the black from the chest over the abdomen.

When first imported, the Grassquits are exceedingly delicate, but once established are very hardy. They are harmless but active little birds, and the pleasant song of the male is an added attraction. Grassquits breed freely in avaries, building a domed nest after the fashion of Waxbills, or taking advantage of an artificial receptacle.

The Cardinals are large, vigorous birds, many of which are brightly colored. The commonest species in captivity with us is the RED-CRESTED CARDINAL (*Paroaria cucullata*), of southern South America. This is dark gray above and white below. The strongly crested head, as well as the cheeks and throat, are bright red. It makes an engaging cage bird, as it lives well and becomes fairly tame. The song is not especially pleasing, but at least is cheerful. It has rather a bad reputation for spitefulness, and should

not be trusted in the company of smaller or weaker species. The usual seeds form its diet, but as it is inclined to obesity, it must not be fed too liberally.

The Red-headed Cardinal (*Paroaria larvata*) is a native of Brazil. It is gray above, the feathers edged with black. The head and throat are red and the underparts white. The head is not crested, as in the preceding species. This bird is somewhat less quarrelsome than the Red-crested and a slightly better singer, otherwise there is not much choice between them.

### Tanagers.

The Tanagers (Tanagridæ) are exclusively South American. Among their numbers they include many beautiful species which make excellent cage birds. Unfortunately, however, none of them is at all common in the market here, and it is only on very rare occasions that any species is obtainable. But since exceptions do sometimes occur, a few words concerning them may not be amiss. The Tanagers which occasionally reach us fall naturally into three groups: the Euphonias (*Tanagra*), the Callistes (*Tangara*) and the larger species (*Thraupis* and allies). The Euphonias are mostly little bluish-black fellows, with yellow crown and underparts. The Callistes are about the size of the English Sparrow and remarkable for the great variety of their brilliant plumage. The larger Tanagers include the Silver-beaks (*Ramphocœlus*) and the Blue (*Thraupis cana*) and the Palm Tanager (*T. palmarum*), the latter two being offered less infrequently than most of the others. The Tanagers are chiefly fruit-eaters, and their diet must include a generous quantity of ripe fruits, such as bananas, oranges, soft pears, grapes, etc. It is best to sprinkle the fruit with soft food, as otherwise many will never touch the

latter, and an exclusive fruit diet is not sufficient to keep them in health. A few will eat meal worms, which should be given to such as will take them. Tanagers are sensitive to cold and draught, but if kept in tight box cages and well cared for they live for long periods.

## Weavers

The Weavers (Ploceidæ) contain a great number of species which are freely imported, their brilliant plumage and hardiness in captivity making them popular as cage birds. For ease in presentation, they are best taken in the sub-groups into which they naturally fall, the Whydahs, the typical Weavers, the Waxbills and the Mannikins and Grassfinches.

Among the Whydahs, all of which are African, the males generally are chiefly black with long, flowing tails in most species, which make them wonderfully graceful when on the wing. The females are brown and sparrow-like in appearance, the males assuming a similar plumage during the winter months. Whydahs make good cage birds, but are at their best in an aviary, where their beautiful flight is seen to the best advantage. A few species have been bred in captivity, the nest being dome-shaped and usually close to the ground. Whydahs may be fed with the usual seed, white millet being a particular favorite. A little soft food and a few meal worms are useful, particularly during the molt.

The Paradise Whydah (*Steganura paradisea*) is the best known species. The male is black in general, with a nuchal collar and the upper breast chestnut, fading to whitish on the abdomen. The lower back is white. The hen is of the usual inconspicuous, brownish color. The tail of the male is long and full, sometimes reaching a length of a foot, although the bird itself is no larger than a sparrow.

Most individuals are quiet and harmless, and may safely be associated with smaller species.

The Giant Whydah (*Diatropura progne*) is the largest of the group. It is a superb bird, almost entirely black, with an orange patch on the wings, the feathers of which are edged with buff. The tail feathers are narrow and pointed, and reach a length of eighteen inches. The species is very striking when in flight. Unfortunately, it is very seldom obtainable.

The Pin-tailed Whydah (*Vidua serena*) is much smaller than either of the preceding. When in color, the male is black above, with a collar around the neck and the underparts white. The beak is bright red. The elongated tail feathers, which usually are four in number, are straight and narrow, often reaching a length of ten inches, giving a curious appearance to the tiny bird. Most Pin-tails are well disposed toward their cage-mates, but occasional individuals are met with which temperamentally are quite the reverse.

The Combasou (*Hypochœra chalybeata*) is commonly included among the Grassfinches, but it seems best to treat it among the Whydahs. It lacks the long tail of these birds, but it has the eclipse plumage, which is not seen among the Grassfinches. The male, in color, is black with bluish iridescence, the bill being white and the legs pink. The female is the usual brownish. Several closely allied species are not distinguished by dealers. It is a quiet little bird, not inclined to be quarrelsome, and usually is long-lived in captivity.

The typical Weavers, of which all of the common species are confined to Africa, give second place to none in point of beauty and hardiness. Song they cannot boast of and their dispositions are not of the sweetest, but brilliant plumage they undeniably possess. As in the Whydah, the males

assume during the winter the dull brownish plumage of the female.

The nests of Weavers are wonderful affairs, usually pendulous, finely and intricately woven of soft materials, such as grass, hay, bark fiber, etc. Like the Whydahs, these birds live well enough in a cage, but are much better in an aviary, where they may have more room to flit about. Several males in such an enclosure will decorate the branches with innumerable nests, at which they work incessantly. For nesting materials, there is nothing superior to raffia or bast, sold by all dealers in florists' supplies, at about twenty-five cents per pound. In spite of this nest-building propensity, it is seldom indeed that Weavers are successfully bred in captivity.

Weavers are notorious for their habits of persecuting smaller birds, and should never be caged with them. A diet of seeds, with a little soft food and a few insects during the molt, will keep them in health.

Of the orange and black species, three are well known in confinement. The Grenadier Weaver (*Pyromelana orix*) is the largest. The male is reddish-orange in general, with the head and throat black, as is the abdomen. The tail and wings are blackish. The Crimson-crowned Weaver (*P. flammiceps*) is similar, but has the crown orange instead of black, the latter color being confined to a patch surrounding the eye and covering the cheek and another on the throat. The Orange Weaver (*P. franciscana*) is the smallest of the three. It has the crown and cheeks black, but the chin and throat are orange. These three species are not distinguished by dealers, and are sold indiscriminately as "Orange Bishops."

Two yellow and black species are equally common. The male Napoleon Weaver (*P. afra*) is chiefly bright yellow, with cheeks, throat and lower abdomen black. The wings

and tail are brownish. The Taha Weaver (*P. taha*) once was rare in captivity, but during recent years has become even more abundant with us than the Napoleon. This species differs from its congener in having the entire underparts black, not divided by a yellow pectoral band.

The Red-billed Weaver (*Quelea quelea*) is a commonly imported species. The head of the male, with the exception of the black cheeks and throat, is rosy pink, which extends to the chest and abdomen. The back, wings and tail are brownish, and the bill is bright red. Russ' Weaver (*Q. russi*) is similar, but has the facial mark whitish instead of black. This bird is considered by many to be merely a variation of the typical form.

The Madagascar Weaver (*Foudia madagascariensis*) is black above in the male, the feathers of the back being edged with bright scarlet and the head, neck and breast entirely of this hue. When in full color it is one of the handsomest of the weavers. It exceeds the others, if possible, in pugnacity, and cannot be caged with smaller birds.

The Masked Weavers (*Hyphantornis* and *Sitagra*) are yellow or olive in general, with black markings about the head and throat. There are a number of species, none of which is abundant here. As they are less handsome than most of the weavers, and no better natured, they are not particularly popular among bird-keepers.

The Waxbills include some of the smallest and most beautifully colored of cage birds. Their songs, which are almost negligible, nevertheless are delivered with a will, and their dainty manners and soft, harmonious shades endear them to all. With the exception of the Strawberry Finch, which comes from India, all of the common species are African.

Unlike the Whydahs and Weavers, the Waxbills do not have an eclipse plumage, retaining the same colors throughout the year, the Strawberry Finch being the single excep-

tion. In some species male and female are easily distinguished, in others sexual distinctions are difficult.

Waxbills will thrive at liberty in an aviary, once they have become acclimatized, but of course must have heat during the winter months. They are seldom quarrelsome and many bird-keepers make a practice of grouping them in large brass cages of the usual open type, where, if not overcrowded, they seem to do very well. If too many are placed together, they very often form the habit of plucking the feathers from each other's heads, so that they make a forlorn appearance. It is much safer, however, to have the cage partly enclosed, even if in a well-heated room, as draughts are always likely to occur. If only a single pair or so are kept, they will be better in a box cage, where they will have ample protection.

Many Waxbills will nest in aviaries or even in cages. For the purpose small boxes or other receptacles, enclosed on all sides and with a small entrance hole, may be provided. These the little creatures will fill with nesting material, such as hay, feathers, cotton, hair, etc. Twine is not desirable, as the birds' legs are likely to become entangled. When completed, the nest may be used not only for its legitimate purpose, but as a sleeping-chamber as well. Incubation with most species requires about twelve days, and the young are fed by the parents, chiefly by regurgitation from the crop. Plenty of green food should be provided at that time, also seeding grasses, small insects and a little soft food, which most species will take.

When first received Waxbills are very likely to be delicate. They must be kept carefully enclosed in cages, and watched closely for some time, until their owner is assured that they are in good condition. It is of great importance that the supply of sand to newly imported Waxbills and other small finches as well be restricted. Such birds are

shipped and kept by dealers, ordinarily without sand, and if given sudden access to an unlimited supply will fill their tiny gizzards to the bursting point, with fatal results. Sand should be introduced in pinches for the first few days until the craving for grit has been assuaged.

The staple food of Waxbills is white millet, to which may be added yellow millet, canary and wild seeds. Spray millet and seeding grasses are greatly appreciated and green food should always be furnished. Many species will eat insects, and a small quantity of soft food is beneficial to most.

The male Fire Finch (*Lagonosticta minima*) is a beautiful atom, mostly rosy crimson, the back washed with brown and the tail black. The sides of the breast have a few tiny spots of white. The female is more brown, tinged here and there with crimson. This little bird is one of the most delicate in captivity, being very hard to establish. Even then the greatest care is required to keep it in health.

The Lavender Waxbill (*Lagonosticta cærulescens*) is known to dealers as the "Gray-blue Finch." The sexes are similar, the color being a soft gray, with black tail, abdomen and facial band. The upper tail coverts and the two middle tail feathers are red. This lovely little bird has almost as bad a reputation as the Fire Finch for delicacy, but once acclimatized it lives fairly well.

The Strawberry Finch or "Avadavate" (*Sporæginthus amandava*) is found in India and Cochin-China. It is an exceedingly common bird in the market and is deservedly popular. The male is orange-red, with wings and tail black. The wing coverts and underparts are spotted with white. The female is brown above and pale buff below, with similar white spots. The male certainly assumes partial or full female plumage at times, but whether or not this takes place at stated seasons has not been worked out. Although

Diamond Finch

European Jay

Giant Whydah

Gray Java Sparrow

one of the smallest of Waxbills, this bird is extremely hardy and lives in confinement for long periods.

The Orange-cheeked Waxbill (*Sporæginthus melpodus*) has been introduced into Porto Rico, where it is found in some numbers. It is brownish-gray above and pale gray below. The cheeks are orange, and a small space in front of the eye and also the upper tail coverts are crimson. The female is slightly smaller and duller than the male. This species is not so hardy as some, but lives well under proper conditions.

The Golden-breasted or Zebra Waxbill (*Sporæginthus subflavus*) is one of the smallest of the group. The male is brownish above, with the underparts yellow, with a tinge of orange on the breast. The flanks are gray with white bars, and a stripe through the eye and also the beak are scarlet. The female is smaller and much less brightly colored. This is one of the hardier species, and once acclimatized will live for several years.

The Cordon Bleu or Crimson-eared Waxbill (*Estrilda phœnicotis*) is one of the most lovely of the Waxbills, but when first imported must be ranked among the more delicate. It is a soft grayish-brown, with the lower back, tail, cheeks and breast pale blue. The male has a crimson patch on the ears, which is wanting in his mate. The Blue-breasted Waxbill (*E. angolensis*) is similar, but the male lacks the crimson near-patch, and the blue is slightly brighter.

The Common Waxbill (*Estrilda cinerea*) is a pale brownish-gray throughout, the feathers with almost indistinguishable dark bars. There is a red streak through the eye, and a patch of this color on the abdomen. The St. Helena Waxbill (*E. astrilda*) is similar, but slightly larger, and the dark bars are easily discernible. Like most of the Waxbills, these species are delicate at first, but are not difficult to keep once they are acclimatized.

The Mannikins and Grassfinches are larger, stouter birds than the Waxbills, and as a rule have heavier beaks. The same general rules for care and treatment apply to both groups, but the present birds average much hardier than the more delicate Waxbills.

The Bronze Mannikin (*Spermestes cucullata*) is one of the smallest of the group. It is brown above, blacker on the head, but fading to white, with dark bars on the lower back. The wings and tail are blackish and there is a metallic green band on the wing coverts. The cheeks, throat and chest are bronzy, and the abdomen is white, barred at the side with black. The female is usually smaller and duller. This is a long-lived and even-tempered bird, but frequently is addicted to feather-plucking.

The Magpie Mannikin (*Amauresthes fringilloides*) is very similar to the preceding, differing in a few minor points of color. It is almost twice as large, however, and has a much heavier beak. Both species are African. Some individual Magpie Mannikins are pugnacious and are unsafe with small Waxbills, etc.

The Cut-throat Finch (*Amadina fasciata*) is a well-known and popular cage bird. It is of a brownish cast, the feathers barred with black. There are a few white spots on the lower breast and abdomen. The cock is distinguished by a red band across the throat. The name has a bloodthirsty sound, which is not entirely deserved, although the bird is not really safe with smaller species.

The Red-headed Finch (*Amadina erythrocephala*) is known to American dealers as the "Amadine Finch." It is a larger bird than the preceding, and, like it, comes from Africa. It is brown above and paler below, where the feathers have darker bars. The male has the head dark red, which distinguishes him from his mate.

The Diamond or Spotted-sided Finch (*Steganopleura*

*guttata*), of Australia, is a pretty and attractive species. It is pale gray above, with the tail black and lower back bright red. The underparts are pure white, with a narrow black band across the chest. This band extends backward along the flanks, where it is heavily spotted with white. The bird is imported only occasionally, but is sometimes to be had. It is harmless and hardy.

The Zebra Finch (*Tæniopygia castanotis*) is the most common of the Australian finches in captivity. The male is gray above, shading to white on the upper tail coverts, which are barred with black. The tail is of the latter color. There is a large chestnut patch on each ear. The throat and chest are gray, banded with black. The center of the abdomen is white, while the flanks are chestnut with white spots. The female lacks the ear-patches, the bars on the chest and the chestnut flanks. The species is easily bred in cage or aviary, and as it is very docile and easily kept, it is an excellent subject for the experiments of the tyro.

The Java Sparrow (*Munia oryzivora*) apparently is a native of Java, Sumatra and Malacca, but has been widely introduced elsewhere. It is a large, powerful bird about the size of the English Sparrow. It is gray in general, with a vinous tinge on the underparts. The tail, head and chin are black, and there is a large, white spot on each cheek. The heavy bill is rose pink. The female is somewhat smaller in body and beak than the male. A white form, said to have been produced by the Japanese, is bred in captivity. The song of the Java Sparrow is rather pleasing, and no bird could be kept in good condition with less trouble. It breeds readily in confinement, in either cage or aviary, provided captivity-bred birds are used. It is best kept with birds of its own size and strength, as it is not trustworthy with smaller species. Oats are a valuable addition to the diet.

The Three-colored Mannikin (*Munia malacca*) comes from southern India and Ceylon. The upper parts are chestnut, the head, breast and center of the abdomen are black, and the remainder of the underparts are white. The Black-headed Mannikin (*M. atricapilla*) is similar, but lacks the white.

The White-headed Mannikin (*Munia maja*), of the Sunda Islands, has the head white, shading to buff and then to chestnut, which covers most of the upper parts. The central tail feathers are rufous and the abdomen black.

The Spice Mannikin (*Munia punctulata*) is another Indian species. It is chocolate above and on the chest, the abdomen being white with black edgings.

All of the Mannikins, which are known among dealers as "Nuns," are hardy and easily kept in captivity. They are always in good condition, the only trouble being with the claws, which require frequent trimming. The sexes are usually difficult to distinguish, but if two birds are carefully compared, the shape and size of the beak will often furnish a clue, that of the male being heavier than that of his mate.

The African Silver-bill (*Aidemosyne cantans*) is light brown above and slightly paler below, the wings and tail being black and the abdomen white. The Indian Silver-bill (*A. malabarica*) is pale brown above and nearly white below. The lower back is white, furnishing a good distinguishing mark, and the wings and tail are black. The females of both species are somewhat smaller and duller than the males. The Silver-bills are dull-colored little birds, but they have rather pleasing songs. They are quiet in demeanor and easily kept.

The Bengalee or "Japanese Nun" is a domesticated breed, produced by crossing the species of *Uroloncha,* but just which is veiled in mystery. The Japanese are given

credit for developing the three forms in which they occur: dark brown and white, fawn and white and pure white. Being entirely cage-bred, the Bengalees are eminently happy under such conditions. The cock has a squeaky song, which he delivers with ludicrous ostentation. Bengalees are easily bred in a cage. If a nest is provided, the birds will generally sleep in it at night, instead of perching after the usual fashion.

The Red-tailed Finch or Star Finch (*Bathilda ruficauda*), like most other Australian species, is a very pretty little bird. It is olive above, the tail dull red and the forehead, cheeks, chin and beak crimson. The under surface is slightly paler and thickly spotted with white. The female is somewhat duller than her mate. The species lives well, and is not difficult to breed in an aviary.

The Grassfinches (*Poephila*) include three species, all Australian, which are common in captivity here. The Common Grassfinch or Parson Finch (*P. cincta*) is brownish above, slightly paler below. The head is gray, while the beak, tail, a band on the flanks and a large round spot on the throat are black. The Long-tailed Grassfinch (*P. acuticauda*) is similar, but has the middle tail feathers lengthened and terminating in a pointed filament. The beak in this species is yellow. The sexes in these two forms are sometimes distinguishable by the size of the black throat patch, which generally is larger in the male. The Masked Grassfinch (*P. personata*) has the beak yellow, as in the Long-tailed Grassfinch, but lacks the long filaments of the tail. The head is brown like the back, and the black about the head is restricted to the base of the beak. These attractive little birds are easily kept, and seem always to be in good condition, their plumage having a soft, silky appearance. They are not difficult to breed, but are inclined to be quarrelsome.

The Gouldian Finches, which also belong to *Poephila,* are among the most brilliantly colored of cage birds. The bright hues of their plumage have made them in great demand among aviculturists since their introduction from Australia, which appears to have occurred about 1885. The Black-faced Gouldian Finch (*P. gouldiæ*) is green above, with the lower back pale blue and the tail black. The head and throat are black, the breast is purple and the abdomen is yellow. The Red-faced Gouldian Finch (*P. mirabilis*) is similar to the preceding, but has the head bright red. The middle tail feathers are lengthened and tapering. The females of both forms are distinguished by the much paler shade of purple on the breast. The female Red-faced seldom has the head clear red, much black generally being intermixed. It seems probable that these two birds are simply phases of the same species, as they interbreed freely both in the wild state and in captivity. There is also a yellow-faced form, which is so rare as to be seen but seldom.

Gouldian Finches are exceedingly delicate when first imported. Like all small finches, they must be given little grit at first, and protected from cold and draught. As they become acclimatized, they increase in hardiness, but even then cannot be considered as entirely safe. Under ordinary circumstances, Gouldian Finches live best in box cages, where they may receive individual attention. Thoroughly hardened birds will thrive in an outdoor aviary during the summer. Under such conditions, they have been bred freely in England, but no one on this side appears to have been successful with them, although at least one aviculturist has had young hatched.

### Troupials

The family of American Orioles and Troupials (Icteridæ) includes a number of native North American birds, such as the Baltimore and Orchard Orioles, the Bobolink, Cowbird and Redwing. The keeping of these species, however, is prohibited by law, and the only exotic form which is freely imported is the common Troupial (*Icterus icterus*), of Colombia and Venezuela. It is orange in general, with the head and neck, middle of the back, wings and tail black. The lesser coverts are yellow, and the middle coverts and edges of the secondaries are white, forming a large patch. The sexes are similar, but the female is slightly the smaller. At the first molt in captivity, the orange is replaced by lemon-yellow. The Brazilian Troupial (*I. jamacaii*) is similar to the preceding, but has the wing coverts black instead of white.

The Troupial is an ideal cage bird, becoming very tame and learning to deliver its clear, whistling notes at command. It is not safe, however, with small birds, and most individuals will promptly kill anything weaker than themselves. Troupials should be kept in large, roomy cages of the box type, and fed on soft food, with an abundance of ripe fruit, such as bananas, oranges and pears, and occasional meal worms.

### Starlings

The Starlings and Starling-like Mynas (Sturnidæ) are practically confined to Europe, Asia and the East Indies, a single species being known from Africa. There are about sixty forms, of which comparatively few are common in captivity in this country. No group of birds is hardier in captivity than this, many individuals living for a great number of years. Although not so gifted as the Hill

Mynas (*Eulabes*), some members of this family make good talkers. Starlings will live in cages, but as they are exceedingly dirty under such conditions, their quarters should be as roomy as possible. Most of the species cannot be trusted with weaker cage-mates. Starlings are almost omnivorous in feeding habits, and will thrive on soft food, fruit of all sorts, insects and an occasional scrap of meat.

The European Starling (*Sturnus vulgaris*) is, of course, only too well known in this country. Introduced in New York in 1890, the bird has spread amazingly, and forms a serious menace to our already decreasing native frugivorous and insectivorous species. Because of this fact, many states which formerly protected the starling now have added it to the list of renegades which are outside the pale. This change brings a modicum of comfort to the bird-keeper, for the starling, villain as he is, is a most interesting pet. His speckled plumage, glossed with violet and green, must be seen at close quarters to be appreciated, and his confiding tameness is engaging. Hand-reared birds sometimes learn to repeat simple words.

Of the numerous starling-like Mynas stray specimens of several species are occasionally seen, but the only one which is really well known is the Common Myna (*Acridotheres tristis*), of India and Burma. It is about double the size of the starling, dark brown above, with the head, neck and breast black. The base of the primaries and their coverts, as well as the tips of the outer tail feathers, are white. The beak and a bare space behind the eye are yellow. Young specimens of this species often learn to speak very well.

### Hill Mynas

The family of Glossy Starlings (Eulabetidæ) is well distributed in the Old World, Asia, Africa, Australia and

the East Indies all possessing representatives. Of the Glossy Starlings proper, no species is sufficiently common in the market to warrant its inclusion here. But the HILL MYNAS (*Eulabes*), commonly miscalled "Minors," are well-known cage birds, and a few words concerning them will not be amiss. Eleven forms of this genus are recognized, of which three are about equally well known here. All are glossy black in color, with a white patch on the primary feathers of the wing. The heavy bill is orange-yellow. On the nape, at each side, is a horseshoe-shaped flap of skin, yellow in color, with the ends pointing forward. The outer extremity of each flap joins a bare space behind the eye.

The LESSER HILL MYNA (*E. religiosa*), of southern India and Ceylon, is little larger than the European Blackbird. The lappets are well developed and crinkly, and the bill is comparatively slender. The GREATER HILL MYNA (*E. intermedia*), which ranges from central India to Cochin-China, is larger than the preceding, but does not reach such large proportions as does the JAVAN HILL MYNA (*E. javanensis*), of Burma and the Sunda Islands. The best point of distinction between the latter two species lies in the lappets, which form something like a right angle with the ear-patches on each side. The third side of this angle is closed with bare skin in the Greater Hill Myna and open in the Javan. These three species, which are readily separated, are seldom distinguished by dealers.

All of the Hill Mynas are gifted mimics and young birds often make excellent talkers, enunciating as distinctly as the best parrots. They are not cleanly birds, and the cage should be as large as possible. It is unnecessary to say that they cannot be kept with small birds. Hill Mynas are notorious gluttons and their food, which consists of a soft mixture, fruit, berries and insects, must be given in limited quantities.

### Crows, Jays and Magpies

The Crow Family (Corvidæ) is one in which the Americas are particularly rich. Unfortunately, most of our own species may not legally be kept in captivity, while tropical forms are seldom available. The Old World also contains a great number of corvine birds, many of which are seen on occasion, but only a very few are imported so frequently as to be readily obtainable.

None of the birds of this group is really suitable for cage life. They should be given the run of a good-sized aviary, where they can have sufficient space to keep them in good condition. Hand-reared specimens remain very tame and often learn to speak a few words. The practice, which once prevailed, of slitting the tongue, with the idea of facilitating speech, is as inefficient as it is barbaric. Crows and Jays are especially subject to colds and roup, and although the northern species can endure unlimited cold, continued exposure to dampness is certain eventually to prove fatal. No bird of this family should ever be trusted with anything smaller or weaker than itself. Crows and Jays are not very particular as to what they eat, hardly anything edible being amiss. Some sort of coarse, soft food, with rice, bread, biscuit, raw or slightly cooked meat, insects and occasional young birds and mice, will provide a well-varied menu.

The American Crow (*Corvus brachyrhynchus*) and its various forms are the pets of boyhood wherever they are found. Unfortunate, indeed, is the child whose environment has never included a young crow! Easily obtained and almost as easily reared, no bird could better meet the demands of the youthful pet-lover. If taken from the nest when half grown, crows are easily brought up on meat (preferably partly cooked), bread or biscuit crumbs, eggs,

earthworms, etc. If it is not desired to cage the pet, it may be given its liberty, full-winged or clipped, and it will seldom stray. Crows not infrequently croak a word or two, but they seldom do more.

The JACKDAW (*Coloeus monedula*) is the only European Crow-like bird which is commonly imported here. It is smaller than the American crow, black in color, with gray nape and white eyes. Pure albinos, most of which come from Austria, are imported in some numbers each autumn, and are very attractive when given space enough to keep themselves clean.

The EUROPEAN MAGPIE (*Pica pica pica*) differs from the American bird (*P. p. hudsonica*), chiefly in its smaller size, and is too well known to require description. With its striking black and white plumage and long tail, it is a graceful and ornamental species. Young birds readily learn to speak a little and gifted individuals often are able to repeat sentences of several words.

The EUROPEAN JAY (*Garrulus glandarius*) is considerably larger than our Blue Jay. It is gray, tinged with vinous, in general color, with the forehead white, streaked with black. There is a mustache of black, the tail and wings being mostly of the same color. Many of the wing coverts are beautifully barred with cobalt and black. The Jay is a handsome, active bird, and frequently more than an indifferent talker.

## CHAPTER XI

## CANARIES

When the first little dull-colored wild canaries were taken to Europe from the Canary Islands, who could have foretold that their descendants would brighten the homes of the world? Who can say why this bird, instead of other European finches, was cultivated and developed to fit it for the place it now occupies in the hearts of men? The Goldfinch and the Linnet both are better singers than the wild canary. The Serin Finch which inhabits southern Europe and even Germany sings at least as well as its island relative, and was much more readily obtained by early breeders. The charm of the exotic may have something to do with it, but perhaps the little olive bird, like the Jungle Fowl and the Mallard Duck, had the happy faculty of thriving in captivity, only waiting for the opportunity to arrive. At any rate the canary, more than any other small bird, has been bred and modified in captivity, almost out of all resemblance to its original self.

The Wild Canary (*Serinus canarius*) is smaller than the ordinary domestic bird. It is ashy-olive above, the feathers with dark central streaks. The forehead, breast and rump are greenish-yellow, and wings and tail are washed with the same color. The sides of the breast are gray with dark stripes, while the abdomen is white. The female is slightly duller than the male. The Serin Finch (*Serinus serinus*), which is often miscalled the Wild Canary, is considerably smaller, and has the yellow of the breast much brighter and more thickly streaked with black. It has been suggested that the modern canary might have originated from a cross

between these two species, but there is no evidence to support the claim.

The Wild Canary is still abundant in its habitat, the Canaries, the Azores and Madeira, isolated islands in the eastern Atlantic. They are caught and kept as cage birds by the inhabitants, but seldom reach the outside market.

Some time during the sixteenth century,* Wild Canaries appear to have been taken to Europe with cargoes of sugar, the sweetness of their song and their foreign derivation bringing them great popularity. It is probable that serious breeding did not commence for some time, but that it did finally take place we have the best possible proof. It must have been many years before any great change in song was noticeable; it is probable that color varieties were more easily obtained. As suggested by Dr. A. R. Galloway,† cinnamon mutants, or "sports," which are of frequent occurrence among most European finches in the wild state, no doubt appeared among the caged canaries. Inbreeding would quickly establish the new color, and once firmly fixed, this might readily lead to the occurrence of yellow.

Song, however, was the main attraction for the Germans, who seem to have been the first breeders of canaries, and it was not until the birds reached England that the great possibilities of variation in form and color were made the most of. To this day, English birds excel in these characters, while the German birds are unrivaled singers.

Every one knows that the canary is almost ubiquitous in America, but its derivation is not a matter of common knowledge. Practically all of the birds offered for sale in the bird stores throughout the country are reared by the peasants of Germany. The great majority come from the Hartz Mountains, where canary breeding is a leading indus-

* Willoughby's *Ornithology*, 1676.

† *Canaries, Hybrids and British Birds*, p. 20.

try. The village of St. Andreasburg has become famous as the original home of the sweet-voiced Roller, but now both this specialized bird and the common one are bred throughout this region.

The handling of the birds is a business of considerable magnitude. Most of it is controlled by two or three New York firms, the largest of which handles, under normal conditions, about two hundred and fifty thousand canaries yearly. At the close of the breeding season in Germany, expert buyers go about among the peasants and secure the birds, many being contracted for in advance. They are concentrated at suitable points and shipped to New York, in lots of thousands, in charge of experienced men, who spend their entire lives in this branch of the work.

Each bird is placed in a small wooden cage, measuring about five inches wide by six inches long and high. Seven cages are strung on a narrow strip of wood, each unit of seven being known as a " stick," or " row." The cages are placed in large frames with wooden back and bottom, and tightly wrapped in canvas during transshipment.

When the canaries reach New York, the cages are placed one above the other in great tiers, and the birds graded according to song. They are then ready for shipment to the thousands of retail dealers who sell them to their final owners.

### General Care

The canary is a hardy bird, inured to captivity and able to endure a great deal. If this were otherwise, it would be less numerous, for no bird is regularly subjected to worse mistreatment. But its ability to exist under the most adverse conditions should not be imposed upon, for endurance has its limits. The canary thrives in an open brass cage, and is commonly so kept in this country. The box cage

is infinitely better, but the brass canary cage is an American institution, which is too firmly established to be uprooted.

If the open cage is used, some precautions must be taken as to its position. Sunlight and fresh air are necessary to the health of the bird, but draughts must be avoided, so the cage must not be placed in an open window. Many persons cover the cage at night with a cloth. If the room is draughty, this is really necessary, but ordinarily the bird will be healthier and freer from colds if it is not coddled in this way.

Canaries are bred in small cages and room for flight is not necessary for their happiness. The individual cage, however, should not be less than twelve inches in each dimension, if the bird is to have space for ordinary exercise.

The perches should be round and thin to allow the bird to clasp them firmly. Perches of varying thickness offer a welcome change. Perches oval in section are sometimes used, but as a bird's foot is fashioned for automatically grasping a round stick this shape is best suited to its needs.

The bottom of the cage should be kept sprinkled with clean sand or bird gravel, which may be renewed frequently. Graveled paper is to be had from dealers, but it seems unfair to provoke the bird with needed grit which it can secure only after a struggle. A healthy canary will never eat more gravel than its welfare demands.

German birds are fed chiefly on rape seed, with a small admixture of canary. English breeders use canary seed as the base, and add small portions of millet, rape, poppy, etc. Both systems seem to have their merits and can be blended to meet the requirements of canaries of any derivation. In feeding it is important to make certain that the seed is free from dust, and to give a restricted quantity. The great majority of canary ills are the result of over-feeding.

During the molt, which normally occurs during the late

summer, when the bird loses its feathers and its voice as well, extra nourishment is required. This is supplied in the form of "song restorer" obtainable from all dealers. These mixtures usually consist of egg cake or zwieback, poppy and flax seeds, and cayenne pepper. They can easily be prepared by any one who cares to take the trouble.

Green food should be supplied freely, and so long as it is fresh will benefit the bird. Frost-bitten or even wet greens should never be used. Chickweed, lettuce and watercress are the plants best adapted for the purpose. Sweet apple is always relished by canaries.

Water should always be cool and fresh, and should not be allowed to become heated by the sun. It is important to clean the receptacle daily, to remove the growth of slime which gathers on the inner surface.

Canaries, like most small birds, should bathe frequently. Some will do so daily without any difficulty. Others will consistently refuse. Most birds will use any small, shallow receptacle, which may be placed in the cage. The outside bath attachment, procurable from any dealer, is a convenient means, and the bird will soon learn to use it. Birds which cannot be induced to bathe should be sprayed frequently with tepid water in an atomizer.

### Breeding

As already stated, practically all of the canaries for the American trade are produced in Germany. England furnishes a few Norwich and Yorkshires, but their numbers are almost negligible. Canary breeding on a large scale, for some obscure reason, appears never to have been attempted in this country. A few Rollers, Norwich, Yorkshires and Belgians are bred for exhibition purposes, but the purely commercial side is entirely undeveloped. Rollers

require skilled handling, and the demand for purely fancy breeds is not great, but common singing canaries can be bred by any one possessed of time and patience. Canary breeding is an ideal occupation for invalids and other sedentary persons, and could be made remunerative if carried out on a scale sufficiently large.

There are two systems by which canaries may be bred. One is the bird room, or aviary, in which the birds are given full liberty, and allowed to seek such mates as please them. The other is the more systematic method of the careful breeder, who pairs his birds with discrimination, and keeps them in separate cages.

A disused room, or a detached structure, with or without open-air flights attached, may be adapted to the purpose. It must be mouse-proof, and of course impervious to rain and wind. Canaries will become hardy and can be kept without heat if well protected, but few breeders care to risk keeping their birds in winter without some artificial warmth. The room should be fitted up with perches, the most suitable being natural branches. Wire nests, wooden traveling cages, small boxes, etc., should be placed in sites suitable for nests, and the usual nesting material—hair, cotton, soft hay, etc.—supplied. An equal number of each sex, liberated in such a room, may be expected to turn out a good number of young, although there is likely to be more or less quarreling. Such a method might well be used by persons engaged in producing common canaries on a large scale, but of course selective breeding under these conditions is impossible.

The most satisfactory system is that by which each pair is kept in a separate cage. This is the only means for controlling the suitable mating of the birds and making certain of the parentage of the offspring. The best cage is of the box type, with all sides except the front tightly closed. The

front is wired, and furnished with a door and apertures for food and water receptacles. Twenty to twenty-four inches long, by ten deep and fifteen high, are good average dimensions. Each cage should be furnished with a slide bottom, which should be kept covered with clean sand or gravel. Such cages may be placed in "stack" form, on shelves about the walls of a room, and a great many pairs of breeding canaries accommodated with a small floor space. Uniform cages, well made and finished, can be so arranged as to give the breeding room a neat and attractive appearance.

The perches should be so placed as to give easy access to the food and water dishes. These last are obtainable in many shapes, the only essential features being that they allow the birds to feed readily, and are themselves easily cleaned. It must be remembered that the birds naturally require more food when rearing young and the food holder must be large enough to contain an abundant supply.

In England, the little wooden nest boxes once generally used have been largely replaced by others of tin and earthenware. Canaries will use almost any receptacle that strikes their fancy, but metal or earthenware pans do not offer the hiding-places for insects that wooden ones do. Breeders in this country commonly use round baskets of wirework, which are furnished with an attachment for fastening them to the cage. These nests are obtainable from all dealers. They are usually lined with soft cloth, to make a foundation for the nest, and placed at the back of the cage, near the top. Hair nesting material can be had from all bird stores. This, with bits of cotton, soft grass, etc., should be placed in the cage, and with it the birds will construct a nest to please themselves.

Healthy canaries will begin to think of pairing shortly after the first of the year, but it is best to hold them back until late February, or even March. A bad start may result

in a ruined season, whereas if mating is delayed until the weather is more seasonable results are certain to be more satisfactory.

Canaries are naturally monogamous, and ordinarily breed in pairs, although under the conditions of an aviary this rule is not always adhered to. Some breeders, for one reason or another, make a practice of mating a cock with two hens. This can be accomplished, but some skill in handling is necessary, as in most cases the hens must be kept separate.

Cocks and hens should, of course, be kept apart until the breeding season begins. When it has been decided to pair them, the cock and hen to be matched should be introduced to the breeding cage. There is generally some little quarreling at first, but this is soon over and the birds quickly settle down to the business of life. Very occasionally individuals will be found which will not agree, and in such cases the cage may be divided with a wire partition until they have changed their minds. Ordinarily this partition is not necessary.

At this time egg food, which consists of about equal parts of grated hard-boiled egg and biscuit, bread or zwieback crumbled together, should be given daily in small quantities, with an occasional pinch of poppy or maw seed. Of course the usual seed must also be continued.

Building will soon begin, and as soon as the nest is complete the first egg may be looked for. The hen usually appears very ill and rough in plumage just before laying, but this need not occasion alarm. However, if the egg is not deposited by the following day, help must be given quickly. A few drops of warm olive oil, inserted in the vent with a medicine dropper, often will bring relief. If this fails, holding the bird over steam, of course being careful to avoid scalding, will almost invariably produce the desired

effect. As a last resort, wrap the bird carefully in a soft cloth and place it in a position where a uniformly high temperature is maintained. This method is applicable to all birds in cases of egg binding.

An egg generally is laid each successive day, until from three to six have been deposited, four being the most usual number. Most breeders remove the eggs, as laid, using a spoon for the purpose. If this is not done they not only serve as a temptation to cocks inclined to egg-eating, but are more or less incubated as each successive addition is made. The consequence is that some hatch several days before the others, the first young birds being so much larger than the later ones that the little fellows have a poor chance of survival. The hen will indicate the completion of her clutch by sitting tightly when the last egg is laid and then the others may be returned to the nest. At this time the egg food should be given only occasionally, as during incubation the food should not be too stimulating. The hen will leave the nest now and then to take a bite or two and take a bit of exercise, but most of her food is supplied by the cock, which feeds her constantly while she is sitting.

In case it is necessary, for any reason, to remove the male, the female may generally be relied upon to hatch and rear the young unassisted.

Incubation lasts for thirteen days, and if the eggs have been removed as laid the chicks all should emerge at about the same time. After two or three days the nest should be examined, and any eggs which have failed to hatch removed.

Egg food with a little poppy seed must now be furnished constantly, and the seed and water dishes kept well supplied.

Canaries feed the young by regurgitation, both seed and egg food being given. In all cases it is imperative that the food be clean and untainted. Green food, if fresh, should be given in moderate quantity daily.

During the first few days the hen sits closely on the young, being fed by the cock and in turn passing it on to the chicks. It is at this time that one of the most common ailments of young canaries occurs. This is known as "sweating," and is easily recognized by the sticky and bedraggled condition of the chicks. It is not, of course, actually caused by "sweating," but by looseness of the bowels of the chicks, causing the excrement to be of a watery nature, and hence not removable by the hen which normally performs this function. The nest quickly becomes foul and the chicks as well. It is customary to remove the cocks under such conditions, thus causing the hen to leave the nest in order to feed. The best remedy is to clean the nest and attempt to check the diarrhœa. If this can be accomplished the trouble will cease.

If all goes well, the chicks grow rapidly, and when barely three weeks old are ready to leave the nest. At this time the hen is likely to be thinking of laying again. If nesting material is not abundant, she may pluck the young birds to line her new nest, and as she may decide to lay in the old one, the best plan is to remove the young birds. If a partition can be placed in the cage, they may be separated from their parents in this way. If this is not practicable, they can be placed in a small cage, so arranged that the parents, or at least the cock, can continue feeding the offspring, through the bars. This they will do until the little birds are able to feed for themselves.

From the first the youngsters must be furnished with egg food and canary, rape and a little crushed hemp. They will soon begin to pick at it, and when four or five weeks old will be able to feed themselves. As soon as this is seen to be the case, they may be separated entirely from the parents and placed in a larger cage. If there are several broods of approximately the same age, they may be placed together.

It is necessary to watch for feather-pulling, a common vice among young birds. Any offenders should be promptly removed, as the habit is contagious and difficult to eradicate.

As the birds progress, the egg food is gradually eliminated, and the youngsters fed in the usual manner for adults. When four or five weeks old, the young cocks will begin to twitter and can thus be distinguished from the hens. At six or eight weeks they begin to molt, only the body feathers being renewed. The flights and tail feathers are not dropped until the following year.

The breeding birds will commence to molt in July or early August and should then be separated for the season.

### Breeds

As already stated, the German Canaries are of but two sorts, the Common and the Roller, alike in color and appearance, and distinguished only by their song. On the other hand, the English birds are much varied in form and not particularly brilliant as songsters. The Belgian Canary offers still another differentiation in shape.

The Common Canary, the familiar bird of our homes, is simply the wild bird more or less modified in color and song. It occurs in green, yellow and cinnamon, both clear or self, and mottled. Little attention is paid to color by breeders, the only requirement being a loud, full song. This is the usual Canary of commerce, and the one which offers the best investment for the prospective producer for the market. It furnishes the great bulk of the birds which reach us from Germany, and now is being bred here in some numbers.

The Roller averages somewhat smaller than the Common Canary, and generally is self-green or heavily variegated, although clear yellows occasionally are seen. The charm of the bird lies in its wonderful song, quite unlike

Wild Canary

Yorkshire Canary

Norwich Canary

Crested Canary

that of its noisier relative. It consists of a series of soft, sweet trills known as "tours," to each of which has been given a name, such as "hollow-flute," "bell-roll," "water-roll," etc. This little bird's voice really is indescribably charming, and no one who has heard it would ever again value the song of another canary.

Rollers are bred, trained and selected with the greatest care. As soon as the young cocks have completed the molt, and commenced twittering, each is placed in a separate cage, in a partially darkened room. An old cock, known as a "schoolmaster," selected for his perfection of song, is now introduced, and from him the young birds learn the most desirable trills. Should one develop a false or harsh note, he is removed at once, lest he ruin his neighbors. The schoolmaster is often assisted by the bird organ, an instrument on which it is possible to produce many of the runs.

The best Rollers still are bred in Germany, in the vicinity of St. Andreasburg. English and American breeders have taken up breeding rather extensively, but the best schoolmasters are difficult to obtain, as they are highly prized in Germany.

Rollers are exhibited at most cage-bird shows, their judging being a matter of considerable interest. Each bird is kept in a small cage, enclosed in a decorative wooden box, the doors of which are kept tightly shut. When the time for judging arrives, the contestants are removed to a quiet corner, where no sound will interfere with accurate hearing. The doors are then opened, one at a time, and the occupant, if well trained, at once bursts into song. The adjudicator, with the greatest care, listens to the performance, marking each bird according to its ability, and deducting for faults. It may well be believed that only a most experienced person may qualify as a judge of Rollers.

The Belgian Canary is one of the group which includes the "birds of position." It was produced in Belgium, but now is widely bred on the continent, and also in England and America. It is purely a "fancy" bird, and is bred for shape and position alone, song and color being negligible. This bird represents the curious tendency of breeders the world over to develop grotesque variations. There is nothing lovely about the Belgian Canary, and only the initiated can appreciate the care and skill required to produce the strange form so much desired by admirers of the breed.

The Belgian Canary is essentially long and slender. The body is slim and the back and tail straight, forming a right angle with the perch, when the bird is in position. The legs must be long and straight, allowing the bird to stand well up. The wings must be held tightly, and meet evenly over the back, the points not overlapping. The most striking singularity is the neck, which is extremely long and narrow. When the bird is fully extended, the neck extends forward and downward from the body, at an angle approximating 45 degrees, the beak being pointed straight down. Well-bred young birds always assume this position when excited, and the habit is fastened in exhibition birds by constant training. It is the aim of breeders to preserve tightness of plumage, but the shoulders must be well rounded, and not made to appear uneven by projecting wing butts. The Belgian Canary is an exceedingly nervous bird and should never be handled if avoidable.

There is one other Continental breed to which we may briefly refer—the Dutch or French Frilled Canary. This is a long, slender bird, somewhat on the style of the Belgian but without the exaggerated pose. Its most striking character lies in the plumage, which is unusually long and wavy and recurved at certain points: the chest, the region of the thighs, the back, the base of the tail and occa-

sionally the nape. This canary is still largely bred in Holland and in France, but is seldom seen to perfection elsewhere.

We come now to the English and Scotch breeds. Since much attention is given to color as well as type in these birds, a few words devoted to this phase will serve for all. Canaries usually occur in three main colors—yellow, green and cinnamon—either clear or marked. The experienced breeder subdivides the yellow birds into two groups. Those in which the color is deep and clear with no shading of white he calls yellows. When the color is pale and with a frosting of white he calls the bird, rather curiously, a buff. Closely allied as these two shades are, each seems to retain its purity when crossed. Strangely enough, the buff birds have the plumage much denser and heavier than the yellows, which excel in fineness of texture. It is customary, therefore, when mating pairs for breeding, to pair a buff and a yellow, with the object of securing all of the desirable qualities in the young. In case density, on the one hand, or silkiness, on the other, is to be intensified, it may be done by pairing two buffs or two yellows, which is known as "doubling." A cross with greens is useful in keeping yellows and buffs at their best.

Green Canaries are a dark olive green in general, the back and sides of the breast being streaked with black. The flights and tail are black, edged with green. Breeders endeavor to get the striping as narrow as possible, thus getting a clearer shade of green. Greens occur in two phases, as do yellows: a dark one, known as yellow-green, and a paler shade, called buff-green. The two forms are mated together, as are yellows and buffs, the typical characters of strength and texture of plumage holding good.

The Cinnamon is a rich cinnamon-buff, the color being

purest on the breast and variegated on the back with stripes of a darker tone. The usual distinction of yellow and buff is made between birds of dark and lighter shade. All self-colored and variegated cinnamons, and even clear yellows, cinnamon-bred, have pink eyes, a never-failing indication of ancestry. Cinnamons are recessives in the Mendelian sense, and two birds of this color mated together never will breed anything but cinnamons. The character is also sex-limited in a curious fashion. A cinnamon hen, bred to a cock containing no cinnamon blood, will produce no birds of this color. A cinnamon cock, with a hen not cinnamon bred, will breed some cinnamons, but all of this color will be hens. On the other hand, cinnamon cocks or hens bred to non-cinnamon birds containing cinnamon blood will produce both sexes of this color.

Cinnamons, as well as greens, were cultivated for years as separate varieties, color being the cardinal point. Recently, however, these colors have been bred into the principal types of Canaries, so that they are now found among most breeds, such as the Yorkshire, Norwich and Border Fancy. Cinnamons, however, are still given separate classes at the larger English shows.

There is still another color which should not be overlooked—pure white. Records of White Canaries are of frequent occurrence in the history of the bird, but not until recently have they become well established.

At the Crystal Palace Show, held in London, February 5-9, 1909, the first White Canary was exhibited.* This bird was bred in England by a Mr. Kiesel, and was, in its turn, the sire of six white young. At about the same time, a Mrs. Marten, of New Zealand, bred some white birds, a few of which were later sent to England. The first birds

*For much information concerning the White Canary, I am indebted to Mr. F. Carl, editor of *Cage Birds*, London.

seem to have occurred from closely related parents which had been mated for "double buffing," but whether or not this combination of inbreeding and pale color caused the appearance of an albino is problematical.

As first produced, the whites were of the common type, and the only object of breeders was to secure purity of color. Now, however, they are being adapted to the standards of various recognized breeds, such as Yorkshires, Norwich and Border Fancies.

At the exhibition of the London Cage Bird Association, held at the Royal Horticultural Hall, London, in December, 1912, the writer inspected eight lovely White Canaries, the cheapest of which was valued at £10. No specimens of this color have appeared in America at this writing.

All of the foregoing descriptions refer to birds of solid color: yellows and buffs being known as "clears" and greens and cinnamons as "selfs." Besides these there are various forms of pied birds, which fall into several groups. The ground color of these birds is yellow or buff, with markings of green or cinnamon. A bird which is entirely clear, except for a single small patch, is known as "ticked." A further admixture of light and dark feathers makes what is called a "variegated." The most highly developed of these birds is called the "even-marked." These markings occur in three sections on each side—the eye, wing and tail. The eye mark should be even and rounded in front, just wide enough to encircle the eye, tapering to a point behind. The wing marks are formed by the secondaries, a varying number of which may be colored, so long as no light feathers are interspersed and the two sides are even. The tail marks consist of from one to three dark feathers at the sides of the tail. These last are not of so much importance as the two former, birds with eye and wing marks only being equally popular. Evenly marked Canaries are difficult to

produce, and no attempt seems to have been made to popularize them, in any breed, on this side.

While on the subject of color, we may consider the question of color feeding. This operation is performed during the molt, the new plumage of the bird coming in a bright orange color of a most attractive shade. The method was discovered about 1870, and the first color-fed birds exhibited created a great sensation among breeders. The secret was carefully guarded for a few years, but finally was given out. When it was found that the birds which had been sweeping the boards at the classic shows owed their success to the humble red pepper, joy and chagrin must have struggled for supremacy. At first cayenne pepper was used, but later experiments showed the sweet red peppers to be equally efficient and less trying for the birds. These are dried and ground and mixed with egg food in the proportion of one part pepper to two of food. Some breeders add a small quantity of sweet oil and sugar to the food. Whether or not these ingredients are to be used is a matter of personal choice and experience. A few weeks before the birds commence molting the use of the food is begun, and it is continued until all of the feathers have been renewed. About a teaspoonful per day is enough for a bird, which of course should have the regular seed in addition. If the color food is not taken readily, the seed may be withheld for a time. Few birds ultimately refuse the food, and most will eat it greedily. When the molt has been completed the food may gradually be discontinued. Contrary to the belief of many, it is not the stimulating character of the pepper that causes the color, but its chemical constituents. Just what the action is we do not know, but the final result is indisputable.

Of the English Canaries, one of the oldest and most popular is the NORWICH. It is a large, full-bodied bird, with

short, round head. The plumage should be soft and fine, but still must be smooth. The wings, as in most canary breeds, lie close and meet in a straight line on the back. The Norwich, which occurs in all of the clear, self and marked varieties, excels in richness of color, and is the bird in which color feeding produces the best results.

The modern CRESTED CANARY appears to have been developed by various crossings of breeds, prominent among which are the Norwich and the Lancashire Coppy, the aim of breeders being to get a bird of the large, thick-set, Norwich type. The crest is the most important point in this bird. This should be formed of large, flat feathers, radiating from a point in the center of the crown. It should be circular in shape, free from upstanding feathers, and should cover both beak and eyes. The back of the crest is a weak spot, many birds having a tendency to exhibit faults at this point. The most popular color is a clear body with dark crest, followed closely by the even marks. The entirely clear bird is considered the least desirable.

In breeding Crests, crestless birds, known as Crest-breds, occur. These birds are of the same type as the typical Crests, but are plain-headed, the only indication of their ancestry being a curling or rising of the feathers over the eye, known as "browing." In pairing, it is customary to mate a Crest with a Crest-bred, a method which seems to produce the best results. Crests of very good quality are imported from England yearly, and offered for sale by dealers, but the breed does not appear to be kept extensively here.

The LANCASHIRE COPPY is the largest of the Canary breeds, its stature being considerably greater than that of the Crest. The name refers to the crest which adorns the head. In this bird the feathers of the crown radiate from the center toward the front and sides only, and not toward

the back, where the feathers merge with those of the nape. Plain-headed birds occur here as in the true Crested Canary, and show the same heavy browing. As in Crests, it is common practice to pair Coppies with Plainheads. The Coppy is not bred now so generally as it once was, its popularity having been weakened by the advent of the modern Crest. Coppies are found only in clear and ticked Yellows and Buffs.

The Border Fancy is really a glorified Common Canary. It is kept in some numbers on both sides of the Scottish border, and is now bred to a recognized standard. It is a small bird, rather slimmer than the German Common Canary, and close and tight in feathering. The head is small and rounded, the back full and straight and the wings meeting evenly with no crossing. The Border Fancy is bred in all of the known colors.

The Yorkshire, while the most recently perfected of Canary breeds, certainly is the dandy of the tribe, and shares with the Norwich the palm of popularity.

It is long, slender and graceful, without the unpleasantly exaggerated pose of the Belgian. It is quiet and steady, as good a singer as any English bird, and a prolific breeder. The original Yorkshire has long been established in its native county, but modern breeders have introduced alien blood of many sorts to bring it to its present perfection.

The Yorkshire is essentially a slim bird and rather long, exhibition cocks being just under seven inches and hens somewhat smaller. The head is small and narrow, while neck and body are symmetrically slender. The whole bird, from tip to tip, should be straight, with no tendency to angles. Well-fitted wings and straight, closed tail are important features. The plumage must be tight and smooth in all parts. Yorkshires are bred in all colors, and are kept in considerable numbers in this country.

The Scotch Fancy is similar to the Belgian Canary, with the body strongly curved instead of straight. The tail follows the curve of the body, so that when the bird is in position the extended head and the tip of the tail are not far out of the same vertical line. The legs appear to grasp the perch from behind, rather than from above, giving the bird a curious air of determination to hang on in spite of attempts to push him off. Scotch Fancies are still very popular in Scotland, and a few are bred here. Color is not sought so eagerly in this breed as in some others.

We now come to the two canary breeds in which color is of paramount importance—the Lizard and the London Fancy. These two breeds undoubtedly are closely allied, and when in nest plumage resemble each other almost exactly. After the molt, however, they are very distinct. Both are of the Common Canary type in body.

The Lizard Canary occurs in two forms: the Gold, corresponding to yellow, and the Silver, bearing the same relation to buff. In the Gold Lizard the ground color above is a soft brown, each feather having a black center and yellow margin. The spangles thus formed must be clear and distinct, and cover the bird's back in straight lines. The flights and tail are black, edged with yellow. The crown, to a line through the center of the eye, is clear yellow, the upper lid remaining dark. This cap must be evenly cut, any wandering of light or dark feathers being considered a serious blemish. The underparts are rich yellow, with an indication of spangling at the sides.

The Silver Lizard is similar in pattern, but the ground color is gray, not brown, the edgings are white, and the cap is pale buff. The legs and beak in each variety are dark. It is common practice to color feed Lizards, the richness of their plumage being much enhanced.

In breeding Lizards, it is customary to pair Gold with

Silver, as yellow with buff. The young are green with yellow cap, showing little resemblance to their parents. At the first molt the spangling appears. As the flights and tail are not shed at this time, they retain their original black color. It is in this plumage that the Lizard is at its best. At the next molt the feathers lose much of their brilliancy and the sharpness of the spangling is destroyed. The flight and tail feathers also become tipped with white. It is of great interest to note that if any of the flights or tail feathers are removed before their normal time, they are replaced by others with white tips.

The London Fancy, when in the nest plumage, is indistinguishable from a young Lizard. At the first molt, however, the dark body feathers are replaced by deep yellow or buff, as the case may be, while the flights and tail remain pure black. This plumage lasts for a year only, the black flights being displaced by grizzled, yellow ones at the first adult molt. The London Fancy, for some reason, is now very little bred, and must soon disappear if not speedily revived.

### Canary Hybrids

The production of hybrids, known as "mules," from crosses of canaries with various other finches, is a pursuit which has long fascinated keepers of cage birds. The birds so produced are invariably sterile, and although they will often pair and lay, no proof of their having produced young has ever been set forth. The cocks are often handsomely colored, and are exceptionally fine singers, combining the wild notes of one parent with the free delivery of the other.

The great ambition of mule breeders is to secure clear, evenly marked or ticked birds. These have been produced in small numbers in Goldfinch, Linnet and Siskin hybrids, but such birds are practically unknown on this side. An

occasional heavily variegated bird is seen, but most are dark selfs, which are to be preferred to the former.

In breeding most sorts of mules, it is customary to run a cock finch with a hen canary, chiefly because of the tractability of the latter, as compared with most wild females, and the certainty with which she will rear the young. Hens that will throw light or clear hybrids are greatly valued, and the establishment of a strain of such hens has often been attempted. English fancy papers are filled with advertisements of "pink-eyed yellow sib-bred hens" for muling purposes, the idea being that "sib" or inbred birds are most likely to breed light mules. Whether or not this be true, it seems certain that hens with pink eyes (denoting cinnamon blood, with its "sporting" tendencies), carefully yellow-bred for several generations, are more likely to produce clear birds than females of mixed ancestry. In spite of all precautions, however, the tendency of the great majority of hens is to throw dark or heavily variegated mules. At any rate, she should be yellow, not buff, in color, as buff hybrids lack the richness of yellows. She should be of the Norwich rather than of the Yorkshire type, since the offspring of the latter are too slender and upright.

Most hen canaries will mate freely with cocks of other species, although some are difficult to reconcile. An important point is to wait until the normal nesting time of the wild bird, since it will not be in breeding condition until then. If introduced too soon, fighting is likely to occur, with disastrous results. The cock finch should be tame, well accustomed to cage life and of course as large and brightly colored as possible.

Pairing, building and laying are much the same with cross-mated pairs as with straight Canaries. It is always best to remove the eggs as laid because of the tendency of many cock finches to destroy them. As soon as the hen is

sitting well, it is customary to remove the cock and allow her to perform her maternal duties unattended. The young birds at all stages are fed and treated as are young canaries.

The most popular hybrid is the GOLDFINCH-CANARY MULE. As already stated, clear or lightly ticked birds are the most valuable and are correspondingly rare. Such specimens are often of the deepest yellow, but always retain a deeper flush corresponding to the crimson face of the male parent, and also the sharp, tapering beak. Handsomely marked variegated birds are common, but as exhibition specimens rank below sound-colored selfs, which are now given more attention than was once the case. Such birds are of a rich brownish hue in general, with a tinge of yellow below. The Goldfinch characters are seen in the wings and tail, and in the orange blaze on the face. Self mules should be as rich and deep in color as possible, and must be free from light feathers throughout. The nape is a particularly weak spot, a great many birds showing a few small, light feathers here.

The LINNET-CANARY MULE is another hybrid which has received some attention on this side. Clear or even light birds are still more rare in this cross, the great majority being dark selfs. These latter resemble closely the Linnet father, but of course never show the red in cap or breast, which this bird has before a molt in captivity.

The CANARY-BULLFINCH MULE is the only one which is commonly bred by pairing a cock Canary with a hen Bullfinch. There is little difficulty in getting the birds to mate and lay, but the eggs had best be transferred to a canary. Fertile eggs are the exception rather than the rule, and such hybrids are not common.

Many other canary hybrids have been produced, chiefly in Europe, but interest in their breeding is not great in

this country. Mr. Wesley T. Page * gives a list of twenty-five mule hybrids with various finches, including the American Goldfinch, Purple Finch and Indigo Bunting. The first two of these, at least, were not uncommon in the days when native birds were kept in this country, and a few are still being bred here by holders of special permits.

A great variety of hybrids between wild European finches have been produced in England, almost every conceivable cross having been made. Very little work of this sort appears to have been done in this country.

* *Species Which Have Reared Young and Hybrids Which Have Been Bred in Captivity in Great Britain*, p. 45.

## CHAPTER XII

## DOMESTIC PIGEONS

No group of domestic birds or animals shows such diversity of form, color and markings as do the pigeons. The molding of the many curious variations must have commenced in very early times; Darwin * states that the first record of pigeons in captivity occurs in the fifth Egyptian dynasty, about 3000 B.C.

That the ancestor of these remarkably diverse forms still exists in the Rock Dove (*Columba livia*) is no longer open to doubt. This bird is found more or less abundantly in Europe, Turkestan and central Asia, to China. Its color is exactly that of blue varieties of domesticated birds. It is pale gray above, darker on the head, breast and upper tail coverts. The neck is beautifully iridescent, showing reflections of green and purple. The rump is white, while the tail is slaty, with a black band near the tip. The basal portions of the outer edges of the outer tail feathers are edged with white. Each wing is crossed by two distinct black bars, one formed by the secondaries, the other by the greater coverts. Its legs are smooth and bare and the bill rather slender, with small, compact wattle. This description would serve for blue varieties throughout the group except for the white rump, which is disliked in most fancy breeds.

The Rock Dove is a dweller in cliffs and similar localities, roosting and nesting on the bare ledges. In India immense flocks, half tamed, inhabit the mosques, and for centuries, in various parts of England, partly domesticated

* *Animals and Plants Under Domestication* (Westminster Edition), p. 511.

birds have lived in the dovecotes. These dovecote birds are not all of the barred type, many showing chequering on the wing coverts, the first variation the Rock Dove shows in captivity. It is this innate tendency to variation that has given us our wonderful array of modern breeds. Once the bounds of normal plumage have been passed, almost anything is possible. Albinos must have occurred among these birds, as among others, and their appearance would quickly lead to pied forms. Other colors appeared, either as distinct mutations or as slight differences which were quickly seized upon by the breeders. The slightest tendency to crests, feathered legs, frills or other abnormalities was fixed and improved with a zeal which now seems nothing short of amazing. But the chief types of pigeons undoubtedly are very old, a legacy from forgotten centuries.

Of the actual breeds of those old times we know little; it is probable that they would not be recognized today as the ancestors of our modern kinds. But the eastern countries became the birthplace of many types now well known—the Fantail, the Owls, the Oriental Frills, certain types of Tumblers and probably others. Most of these birds have been developed and greatly improved since their introduction to western Europe, where many new varieties were created. On the other hand, in some groups the East has more than held its own; Smyrna is still famous for the wonderful Oriental Frills produced there.

### General Care

Pigeon-keepers may be divided into three groups: those whose birds live in a state of semi-liberty breeding entirely without control and receiving little or no attention; those who breed squabs on a commercial basis, and have no interest in their birds beyond the weight of edible flesh they can

produce; and those who keep pigeons because they like them, and so give them the care and attention they should have, without too close an eye on the account book. It is to the last group only that we shall devote space here.

Although fancy pigeon breeding is now a well-developed art in this country, the tyro who ventures into higher circles will soon find himself confused by the intricate mysteries of breeding and selection, not too well understood by the élite themselves. Because of their remarkable variations and rapidity of reproduction, pigeons offer an excellent field for the study of these questions, and the thoughtful person, whatever his motive, will find much to repay his efforts.

Pigeons are hardy creatures, and all but the most delicate breeds can endure much privation. The flocks which live untrammeled in our cities, spending their days in the streets and their nights among the cornices of buildings, are a familiar example. In spite of this fact, however, pigeons of all sorts are better for suitable housing, and with the finer breeds real protection is a matter of necessity.

In building or arranging a pigeon loft, much depends on the nature of the birds to be kept. Flying birds, such as Tipplers, Rollers and Homers, naturally do not require the loft space necessary for those which are always kept in confinement. In all events, the loft must be light, dry and tight enough to preclude danger of draughts. Artificial warmth is unnecessary except in very unusual cases. It is of the greatest importance that the loft be made, as nearly as possible, rat and mouse proof. The former, especially, are a menace, and their inroads are certain to be serious, if they gain access. Individual perches, of the $\Lambda$ or other similar type, should be placed about the walls, thus preventing much quarreling, causing the accumulation of droppings at certain points and avoiding the obstruction of the central space. As the feet of pigeons are adapted for sitting on

flat surfaces, rather than for clasping round objects, perches should be arranged in accordance.

Every loft has its own particular arrangement of nest boxes, which are built to suit conditions. There are a few points, however, in which all should agree. As pigeons, when in proper breeding condition, usually have well-grown young in one nest and eggs in another, it is necessary that each pair be provided with two sites. This is best accomplished by dividing the available space into compartments, say three feet long. Each compartment is then subdivided, forming two smaller inner chambers. Here may be placed shallow earthenware pans, obtainable from all dealers, or small wooden boxes, in which the birds will build their nests. The partition dividing the compartments should be high enough to prevent the young in one nest from disturbing the parent engaged in incubation in the other. If conditions are suitable, it is best to build nesting compartments on the floor, thus avoiding the danger of injury to the young birds by falling from the nest. Where this is not feasible, they can be erected in tiers along the walls. Each pair will select and hold its own domain, jealously defending it against all comers.

It is an excellent plan to arrange the compartments so that they can be closed temporarily with wire netting. They are then useful for confining the pairs at mating time.

Sea sand, clean and free from clay, is the best material for covering the floor. Sawdust is used by some, but it blows about, especially if thinly spread, and is likely to be picked up, with injurious effect, by young birds. If the sand is gone over with a very fine rake and worked through a sieve, once a week or so, the loft will always be clean.

If a flight is to be attached, this may be made of any size desired, but equal care must be taken to make it vermin proof, unless the birds are to be fed inside and can be

fastened in at night. In this case two-inch mesh poultry netting is sufficient to restrain them. The flight should be fitted with perches, so placed as to induce the inmates to take as much exercise as possible.

Whether the birds are to be confined or are to have their liberty, it is best to accustom them to the use of bob-wires. This is done by placing a wire of medium weight, bent in the form of an inverted U, over the inner side of the hole through which they pass. The wire is fastened at the top with staples, so that it swings easily. A strip of wood is placed at the bottom, so that when pushed against from without the "bob" yields freely but prevents passage in the opposite direction. These wires can be raised when the birds are permitted to pass in and out, but when it is desired to confine them to the loft they have only to be dropped, when all that enter must remain within.

Pigeons flying at liberty, if well fed, will seldom leave, the greatest difficulty being in getting them settled. This is best accomplished when the birds have eggs or young, since they will hardly stray at this time. If the hen of a mated pair be confined where the cock can see her, he is not likely to leave the vicinity. If much apprehension is felt, it is a good plan to confine one wing in a sling, in such a manner that it cannot be fully used for flight. After a bird has been on the loft roof for a few days, thus hampered, it may safely be given its liberty. Pigeons of flying breeds, if fully adult, are very difficult to settle, and it is best to keep them confined and liberate only the young.

The staple food of pigeons consists of various grains. Canada and maple peas, dari, wheat, buckwheat and barley are excellent. Cracked corn is used by many, but it is especially dangerous for pigeons, not only for its fattening qualities, but because it is often unsound before cracking and once broken molds very quickly. The small, hard, flint

corn is excellent, if used in moderation, but is not always obtainable. Tares, or bird vetch, is one of the very best pigeon foods, but is rather expensive. Canary seed and hemp are eaten with eagerness, but should be used as an occasional treat, not as a regular item of diet.

Two methods of feeding, apparently with an equal number of adherents, are in vogue. Some feed once or twice daily, giving just what the birds will pick up and no more. Others supply grain in hoppers, always accessible to the pigeons. The first system, in spite of the rather unnatural stuffing of the crop, will keep the birds fit and free from the many disorders of the digestive tract which follow overfeeding. It is very necessary, however, when squabs are in the nest, that food be available at all times, so it would seem best to accommodate the mode of feeding to the seasons.

Green food is an article which many pigeon-keepers neglect to give their birds, but which, nevertheless, is of importance in the maintenance of health. Clover, lettuce, cress, sprouted oats, etc., are among the best.

Small grit, in the form of oyster shell, or some of the many prepared articles, should always be accessible. The quantity which pigeons consume, in the breeding season and out, is astonishing, and trouble will follow if the supply is not kept up.

Pigeons are well known to be very fond of salt, and will seek it in the most unusual places. Most breeders keep a lump of rock salt in the loft, at which the birds work with great perseverance but small result.

When well accustomed to it there certainly is no danger, but pigeons which have been deprived of salt for some time may suffer from diarrhœa if suddenly given free access to a lump, particularly if the atmosphere is damp.

Pigeons are inveterate bathers, and for this reason drink-

ing water should always be supplied in fountains, which may readily be cleaned. This insures the purity of the contents. A bath should be furnished daily in summer and in mild days in winter. The receptacle should be wide and shallow, for the birds will crowd it to its utmost capacity. As soon as all have become properly soaked, and are stretched out in the various ludicrous attitudes assumed in drying, the bath should be removed, to prevent the dirty water being drunk.

### Breeding

Pigeons mate in pairs, and normally are strictly monogamous. Under the conditions imposed by close confinement, however, the rule is often violated; more often, perhaps, than most breeders realize. Because of this fact it has lately become the practice of the more advanced keepers of pigeons to use the single-mating compartment system, by which each pair is confined separately. Such a compartment should not be less than three feet in each dimension, even for the smaller breeds. The writer recently inspected a well-known stud of Runts, kept on the single-mating plan. Many of the birds had not been out of a small pen in several years, yet all were in perfect condition. With more active breeds, however, it is best to give each pair, on successive days, the use of a common flying space.

If the general practice, still in vogue with the great majority, of placing all the breeding pairs together in the loft, is to be followed, occasional *mésalliances,* accidental or otherwise, are to be expected. These are more frequent at the beginning of the season, when the birds naturally are in an over-excited condition. Later on the danger of such happenings is very much reduced. Properly mated pairs will generally prove faithful, except in the case of illness of

one individual, when the other is very likely to seek diversion elsewhere.

Pigeons which have been separated, as to sex are ready for breeding at almost any time after the autumn molt has been completed. The time for pairing varies according to climate and the warmth of the loft. Many breeders start their birds in January, but it is better, in most cases, to wait until well along in February. The weather is then likely to be milder, and by the time squabs are about the days are longer, giving the parents a more extended feeding period.

When it has been decided to start the birds, the pairs, which of course have been carefully selected beforehand, should be placed in the nesting compartments which it is desired they shall occupy. Having been supplied with food and water, they may be left for three or four days—longer, if necessary—until they are seen to be mated properly. If in good breeding condition, almost any cock and hen will accept each other at once, but they may not safely be liberated in the loft for several days. Very rarely individuals are found which do not take kindly to the mates selected for them, but such prejudices will invariably succumb in time. Some cocks are inclined to be savage and very hard drivers, and such birds must be watched lest they injure the hen when first introduced. It is best to start all of the birds at one time, as there will be less fighting in the loft, and the young birds will be hatched together.

When all of the pairs are believed to be safely mated they may be let out of the pens. There will be a great deal of quarreling at first, but this will soon give way to the work of nest-building, each pair keeping its own quarters. Aggressive cocks may be curbed, and timid ones assisted, by various arrangements of barriers, which will suggest themselves to the owner.

Nesting material must now be supplied, of which the birds will build their nests. The carrying is generally done by the cock, the hen arranging his contributions as he brings them. Straw is used by many, but it is such a perfect haven for lice that its use certainly is not to be commended. English breeders still use it freely, but in this country thin Cuban tobacco stems are most popular. Very long, soft, pine needles have recently appeared on the market, and seem to furnish an ideal material.

After about a week of tender billing and very strenuous driving on the part of the cock the first egg should appear, generally late in the afternoon. This egg is incubated more or less closely, until early in the afternoon of the second day following, when another should be added. Young or weak hens frequently lay but one egg, and there are cases, well authenticated, in which three have been laid.

Many breeders make it a practice of removing the first egg as soon as laid, substituting a dummy, and returning the original when the second is laid. This is because some birds, particularly in cold weather, sit closely on the first egg, causing it to hatch a day or so before the other, thus giving the chick an advantage which its nest-mate is never able to overcome. Others seem to be able to furnish just enough warmth to keep the germ alive, so that incubation does not progress much until the second egg is added, thus allowing both to hatch at about the same time.

It is usual for cocks to sit during the day, from nine or ten in the morning until late in the afternoon, the hen doing duty during the remainder of the twenty-four hours. The precision with which hours are kept, and the affectionate bowings and billings with which the change is made, form an interesting study in domestic relations.

If all goes well, the eggs should chip on the eighteenth day after the first was laid, and the young birds should

emerge a few hours later. If the parents are known to be steady, it is a good plan to examine the nest at hatching time, as squabs often get into difficulties which are easily remedied. If one appears to be having trouble in extracting itself, it may be gently assisted, but should never be taken entirely from the shell. If the smaller portion can be removed without causing the lining membrane to bleed, this may be done, but the part containing the remainder of the yolk sac should be left.

For several days after hatching the squabs are fed on soft, thoroughly digested food, known as "pigeon milk." This is formed in the crop of each parent, and is present a day or two before the hatching is due. The chick is fed by regurgitation, as soon as it emerges, the act being performed by whichever parent happens to be on duty at the moment. After three or four days have passed small grains are mixed with the "milk," and at a week old the squab is fed entirely on grain.

Most breeders who keep and mate their birds systematically ring each squab with a seamless band, bearing year and date. This is placed on the leg when the squab is four or five days old, by pressing together the three forward toes and passing the band over them and up the leg far enough to clear the hind toe. Once in position, it never can be removed except by cutting, and serves to identify the bird throughout its life.

Pin feathers begin to appear at five or six days old and soon the squab is covered with growing plumes. It is at this time that the most insidious enemy of the young pigeon —canker—appears. Canker is a mixed infection, of rather mysterious origin, but probably is formed by a vegetable parasite. It is laid to various causes—dampness, inbreeding, heredity, etc.—but moldy grain no doubt is the true source of the trouble. At any rate, when the young bird

is seen to be breathing and swallowing with difficulty, an examination very often will show a lump of yellow, cheesy matter adhering to the walls of the throat. If this growth can be removed without causing bleeding, and the spot treated with iodine, a cure is often possible. But most cases are hopeless from the beginning and not many birds are saved.

When the squabs reach the age of about two weeks, the parents, if in good condition, will begin to think of another nest. They should be discouraged from laying too soon, as a second pair of young may appear before the first are able to care for themselves. When the eggs have been laid, most of the care of the young is taken over by the cock, although the hen freely assists.

The squabs will leave the nest and begin to explore the loft in the vicinity at four or five weeks old. They must be watched carefully at this period, to prevent their persecution by the cocks, and to see that they have enough food. By six weeks they should be feeding for themselves, and it is best to remove them to a separate loft, where they can have better attention and avoid overcrowding of the breeding quarters.

At about three months molting commences, the first indication being the dropping of the inner primary. This molt progresses slowly in early hatched birds, some of which will finish and molt again in the autumn.

Precocious birds show sex at a very early age, and forward cocks will mate at three and one-half or four months. Such activities should be discouraged, of course, and it is always best to separate the sexes as soon as they can be distinguished.

About the middle of July, or perhaps a little later, the stock birds will commence molting and then are best separated for the season. To continue breeding during this

period is certain to result in various troubles, and the few young reared seldom compensate for the injury to the overworked breeders.

Cocks and hens should be placed in separate quarters and allowed to renew their plumage without thought of the cares and burdens of matrimony. The strain of the reproductive season is very severe, especially on the hens, and this period of recuperation is a necessity for well-bred birds. They should be kept in this restful condition until mating time again appears.

With all short-beaked breeds, such as Owls, Oriental Frills and Short-faced Tumblers, as well as some others, it is customary to make use of feeders. These are birds of known diligence and steadiness, which may be depended upon to rear the young, if care will do it. Common pigeons, Homers and Long-faced Tumblers are well suited for the purpose.

In large studs two or three pairs of feeders are kept to each pair of stock birds, thus insuring the proximity of laying time. The feeders must lay within a day or two, at the most, of the pair whose eggs they are to hatch. The eggs are transferred as soon as laid, and the stock birds are usually allowed to hatch and feed the feeder's young for a few days, at least until the "milk" no longer is formed.

Although some birds are very particular as to the young they feed, and will not accept strangers large enough to be recognized, others will take any that will acquiesce. Such birds are invaluable in a loft of feeders, and should be retained as long as they are able to perform their duties.

It often happens that, from one cause or another, a young bird will be without an adequate food supply before it is old enough to care for itself. In such cases one must resort to hand feeding. If the squab has reached the grain

stage, this can be accomplished, very laboriously, by passing food down the throat with the fingers, until the crop is reasonably full. Grain to be used for such purpose should first be soaked in water. It is much easier, and not really so repulsive as it sounds, to feed the little bird by mouth. By taking a mouthful of clean grain, and holding open the squab's beak with the thumb and finger of one hand, its crop can be filled to a satisfying degree in a very few minutes. Even tiny squabs, still being fed on "milk," can be reared with Mellin's Food and yolk of egg, given with a medicine dropper. This is a difficult matter, however, as the tiny chick must be kept warm and fed often, so few but experts would care to attempt it.

### Colors of Pigeons

Before describing the various breeds, it is best to consider the typical colors, which run through the group. Five solid colors are commonly recognized, known, when unmixed, as self: white, black, dun, red and yellow. Of these dun and yellow are dilute forms of black and red, respectively. That is, the pigment is identical, but in the dilute forms the particles are separated by colorless spaces, thus giving a paler shade. These dilute colors, as well as others to be described, are recessives in the Mendelian sense, and sex limited as well, so that chance birds which occur are almost invariably hens. It is only in the breeds in which these colors are well established that cocks are common.

Of white there is nothing to say, except that the color must be pure throughout, with a soft iridescence on the neck. The beak and toe-nails usually are white as well. Most breeders pay little attention to color in white birds, but there is no doubt that strains could be established which soil less easily than others. This has been demonstrated in

white Fan-tails. White birds generally have dark or "bull" eyes, except in breeds in which a white or "pearl" iris is demanded, such as the Tumblers, Cumulets and Jacobins.

Black is a beautiful color when seen at its best, the iridescence extending from the neck well down over the back. There should be no tendency to bluishness or bars on wing or tail.

Birds with bronze on wings and tail are known as kites, and are frequently crossed with blacks to improve the color of the latter. Blacks are commonly bred with duns and reds, which intensifies the black. Young birds of this color generally may be known as soon as hatched by a black ring around the beak and very heavy down.

Dun is a wood-brown color, although the variation in shades is great, the flights generally being lighter. Light duns frequently have dun bars on wings and tail, but the darker birds are usually free from this. Duns should be clear in color, with no tendency to yellowness, particularly on the breast. Duns generally are hatched with a brown ring on the beak and with little down, although the latter is not always the case.

Red is a bright chestnut color, not easily described. There are many shades and as many opinions as to which is most desirable. At any rate it should be sound throughout, with no tendency to grizzling in flights and tail, or pluminess on abdomen and rump. The neck should be free from green iridescence. While reds and blacks are often mated, with advantage to the blacks, such birds must be used with care in red breeding, because of the tendency to produce a dark shade in the tail. Yellows are the safest cross with reds, but there is always a tendency to weaken the color. Reds generally are hatched with a red beak-ring.

Yellow is a soft cinnamon color, with the usual brilliant

neck, which should not be tinged with greenish. Yellows are prone to the same weaknesses as reds—pale flights and tail, and plumy or grizzly rump and underparts. The shade most desired is rich and deep, in contrast to the pale, flat cast which is often seen. Yellows are benefited by the red cross. Birds of this color may generally be known from the first by the yellow beak-ring and very scanty down.

Reds, yellows and duns, particularly the two latter, if intended for show purposes, must be protected from sun and rain, which have a very detrimental effect on the plumage.

Of the barred varieties there are four recognized types—blue, silver, mealy and cream. As in the selfs, we find that two of these colors are dilute forms of the others, silver bearing that relation to blue and cream to mealy. As in the case of yellow and dun, silver and cream are sex-limited recessives, which accounts for the scarcity of males in these colors.

Blue has already been described for the Rock Dove, and nothing further is needed, except to say that the wing bars must be round, broad and distinct. White rump and thighs, as seen in the wild bird, are replaced by blue, as far as possible. The lighter shades of blue, if not inclined to be grizzled, are very attractive, as they form a sharper contrast with the bars.

Silver is an even, pale shade, closely bordering on white. The wing and tail bars should be black, but this is seldom attained, most birds being dun or kitey. The tips of the flights approach dun, while the tail, neck and breast are of a dark ashy cast. The ground color should not be creamy, and the breast should be free from yellow.

In the mealy the ground color is also close to white, but has a somewhat harder appearance than silver, difficult to describe. It is easily distinguished, however, by the reddish wing bars, neck and breast. There is much confusion over

Rock Dove — Flying Tippler

Homing Pigeon — Birmingham Roller

these two colors in different breeds. The best silvers are seen in Owls and Muffed Tumblers. Among Homer breeders and some others, however, mealies have always been known as silvers, a practice which seems to be as ineradicable as it is incorrect. Mealies, which also are sometimes known as silver duns, are of many shades, some of which closely approach dun, with dun bars. If the term silver dun could be confined to these dark birds, as is done in the American High-flyer, the clouds of color nomenclature would be considerably cleared.

The general cast of the cream is very pale, with a slight creamy tint. The bars, neck and breast are a soft yellow, forming one of the most beautiful color schemes found among pigeons. Curiously enough, creams are considered "off colors" and hence not particularly desirable, so that they are not common in any breed.

Chequers have, in addition to the wing bars, markings of the same color on the wing coverts and sometimes the rump. In all cases the chequering should be even and distinct. In the blue chequer the markings are of black, about evenly divided with blue. The black chequer is in reality simply a very dark blue chequer, in which the blue is all but obliterated. The silver chequer has dapplings of black or deep dun, according to its wing bars. The red chequer is to all intents and purposes a dark mealy, with marked wings. Dun chequer is a pretty and usual color, the wings being set off in two shades of dun. The yellow chequer is actually a chequered cream, not a yellow.

Blue, black and red chequers are recognized as standard colors in many breeds, while the pretty silver, dun and yellow chequers are frowned down as off colors.

There still remain two colors, not generally recognized as "standard." One of these is lavender. This is a soft, ashy shade, with a real suggestion of lavender, and generally

is not accompanied with bars. It is found chiefly among Owls and Carriers.

Grizzle is a mixture of blue and white, with the former predominating, thus giving the effect of a blue bird which has become deeply impregnated with white. The wings should be evenly powdered with blue and white, while neck, wing bars and tail are as dark as possible. Grizzles are best crossed with blues, in fact this is quite necessary to keep the color as it should be. Grizzles are found chiefly among Dragoons, but an attempt is being made in England to produce Show Homers of this color.

### Pigeon Breeds

The origin and derivation of the many pigeon breeds are so obscure, and so much confused by crossing, that to attempt a systematic classification would necessitate discussions and digressions that would exceed the bounds of this work. We shall content ourselves, therefore, with presenting the best known breeds in an order chosen as much from convenience as from affinity.

Fifty, or even twenty-five years ago, no writer on pigeons would have thought of beginning his treatise without considering at first the four "high-class" breeds—the Carrier, the Barb, the Pouter and the Short-faced Tumbler. Of late years, however, the fact that over-specialization is as fatal under artificial selection as under natural selection has been demonstrated. The exaggeration of special characters, which led to the extinction of prehistoric monsters, may prove equally fatal in the case of domesticated creatures. Accentuation of abnormal features, for themselves alone, without regard to the symmetry of the whole, has turned away the followers of these four breeds, so that now their very existence seems threatened. Attempts to revive them

are made periodically, but concessions to the laws of beauty must come before advance toward the old status can begin.

Most fancy pigeons bear little practical value; their only excuse for being must be an appeal to the æsthetic sense. In such an aspect their cultivation is desirable and beneficial. As soon as ugly abnormalities become uppermost in the standards of a breed, so that only the expert can see its points, its doom is sealed. This fact is evident in every group of domestic animals, and should not be lost sight of by those who cherish them.

### The Homers

Of all our modern breeds, the Flying Homer is probably the closest to the Rock Dove. In appearance the chief modification is in the head, which generally presents a straight, well-filled line from crown to tip of beak, with fairly large wattle. There is generally more increase in the size of the eye-cere. In the true flying bird, however, which is bred for strength and speed, appearance is of little importance. It is strong and light-feathered, with thick, rounded shoulders and tapering body. In attitude it is always bright and alert, giving the impression of a race-horse awaiting the word to start.

Flying Homers are bred chiefly in blue, black and red chequers, and all of these colors pied with white. Self blacks and whites are sometimes seen, but color is given little attention among these birds.

Pigeons have been used as messengers, from remote antiquity. The present homing race was perfected in Belgium, by just what crosses is something of a mystery. It is supposed, however, that the Owl and the Cumulet, and probably others were concerned. The formation of the head and the frequent appearance of a frill suggest the former, and the high-flying tendency the latter. Speed, endurance and the

homing instinct were the only characters which interested the originators of the breed, and these standards still remain among followers of the Homer.

The instinct which makes the Homer return to its own loft has been and still is the subject of much discussion. The best explanation seems to be that it really is instinct, aided by careful training, and not merely sight and training alone, as supposed by many. The experiments of Prof. John B. Watson * throw much light on the subject. Two Sooty Terns (*Sterna fuliginosa*) were taken from their nests on Bird Key, Tortugas, to a point at sea, off Cape Hatteras, and there liberated. This is outside the normal range of the species, and it is reasonable to suppose that neither bird had ever before been in the locality. Both returned safely to their nests, the distance of 1,081 miles being covered in five days.

It thus becomes perfectly evident that the homing instinct is very strong in birds, and that it asserts itself under the most trying circumstances. Domestic pigeons, having been in captivity for centuries, naturally have lost much of this instinct. In the Flying Homer, however, it has been fostered and preserved to a very considerable extent, although probably it is not as well developed as in many wild birds.

While a young Homer usually will return to its loft from a distance of five or ten miles, or even more, in any direction, for greater distances an elaborate system of training is necessary. This training is begun as soon as the youngsters have become strong on the wing and are well acquainted with the immediate neighborhood. They are then sent in a basket, to a distance of a half-mile or so, and there liberated. This operation is repeated frequently, the length being increased to a mile, then five, ten, and so on, up to fifty, with

* Carnegie Institution of Washington, Publication No. 103, 1907.

an increase of about ten miles. The steps may then be increased more rapidly. All this liberation should be in one direction, an ample demonstration of the fact that instinct alone is not sufficient to take the birds home. After the 100-mile point has been reached, quality begins to assert itself, and the individuals which remain when the final 600 or 700 flies are made will represent the very cream of the flock. Beyond this distance competition flies are not customary, but considerably longer ones, some well authenticated, have been recorded for single birds. Mr. John Fischer, National Race Secretary of the International Federation of American Homing Pigeon Fanciers, informs the writer that a Homer belonging to a Mr. Brouillette in 1916 flew from Denver, Colorado, to Springfield, Massachusetts, a distance of 1,689.44 miles. Twenty-two days and three hours were required to accomplish this feat.

The velocity at which Homers fly is of much interest, as it throws some light on the question of how fast birds in general travel, particularly during migration. Mr. Fischer is authority for the statement that in 1900 a Homing Pigeon owned by Mr. William J. Lantz flew 100 miles at the rate of 2,511.87 yards, or nearly one and one-half miles, per minute. This is considerably faster than the more recent estimates of the speed at which most wild birds fly, at least for similar distances.

A great number of societies are devoted to the culture of the Flying Homer, training and competition flies being held in unison. Of recent years birds which have flown specified distances are exhibited at shows, divided into classes which accord with achievements on the wing.

When a message is to be carried, it is written on very thin paper and inserted in a small metal tube, which is attached to a leg or a central tail feather of the bird. In the days which preceded the appearance of modern methods

of communication, the "Pigeon Post" was of the greatest value. Even now Homers are frequently used as messengers when other means are not available.

The practice of exhibiting Flying Homers has led to the formation of several derivatives, which are valued purely as show birds, and are not used for flying. The oldest and best known of these is the Show Homer. This is the largest of the Homer breeds, and undoubtedly contains generous infusions of Scandaroon, Antwerp and perhaps other blood. Its chief characteristic is the head, which is very long and presents in profile a perfect curve from the crown to the tip of the beak. The latter is stout, straightly set and black in color. The wattle is smooth and neat, conforming to the curve of the head. The eye is white or pearl, surrounded by a small, fine cere of dark shade.

An intermediate type is known in America as the Exhibition Homer. It is smaller than the Show Homer, with cobby body and short flights, while the head from crown to tip of beak is flat and straight in profile, instead of full and curved. Its other points are similar. In England, where these breeds originated, a rather absurd situation has arisen, through dissension among their various followers. It thus happens that the bird just described is known there as the Exhibition Flying Homer, while a very similar breed, with less exaggerated head points, is known as the Genuine Flying Homer. Since the two sorts are almost identical, and neither, in spite of reassuring titles, may in any sense be considered a true flying bird, the American solution seems the only way out of the difficulty.

### The Antwerp

Another descendant of the Flying Homer is the modern Antwerp. It should not be confused with the Flying Homer,

although the latter bird was formerly known in this country as the Antwerp. The breed to which the name properly belongs was developed from the old flying birds, various crosses undoubtedly being used. It is typically large and massive, in size perhaps second only to the Runt. Its chief characteristics are the head points. There are three types, known respectively as short, medium and long-faced. In the short-faced the beak is short and heavy, presenting, with the wattle and skull, a curve approaching a circle. The long-faced type has the bill much longer and naturally less massive, the curve being more gradual from tip of beak to crown. The medium-faced lies between the two extremes. The beak wattle should be smooth and neat and just large enough to give the required fullness of face. Eye-cere should be small, fine and dark in color. The iris is deep red.

Antwerps are found chiefly in blue, mealy and silver dun, and blue, black and red chequers. Of late years they have decreased in popularity, and in this country are kept very little.

### The Dragoon

The origin of this bird is somewhat obscure, but it is an old breed, probably a branch of the same stock which produced the ancient Horseman and the modern Carrier. Its close relation to the latter is undoubted, as shown by the tendency of many birds to become very heavily wattled as they progress in years.

The Dragoon no doubt was at one time used as a messenger, but now is a fancy bird, pure and simple. It is of good size, stout in body with short tail and wings. The neck is of moderate length, with no hint of the elongation seen in the Carrier. The head is the point of greatest importance. The skull is broad and wedge-shaped, while the bill is straight and stout. The wattle is rather large, but should be as

smooth and fine as possible. It should be of such size and shape as to complete a nearly straight line from tip of mandible to crown, above which it should not project. The eye-cere should be narrow and dark in color. The eye is bright red, except in whites, which are dark-eyed.

Dragoons are one of the most popular breeds just now on both sides of the Atlantic, and are extensively bred. They occur in many colors.

### The Carrier

Whatever the origin and the former uses of the Carrier may have been, it stands today as a breed which once was known as the "King of Pigeons," but now has greatly declined in popularity. It is probable that the ancestors of the Carrier and the Dragoon were identical, and both breeds may have been used for flying in the early days. However this may be, the Carrier was soon evolved into an exhibition bird, with neither the ability nor inclination for flying.

The Carrier is of large size, and strong but slender build. The legs and neck are considerably elongated, giving the bird a high station. The skull is flat and narrow, and the beak long and stout. The chief points are in the enormously enlarged, flesh-colored beak wattle and eye-ceres. In adult specimens the former extends to the end of the beak on both mandibles, and should be spherical in form. The eye-cere should be circular and reach nearly, if not quite, to the base of the wattle. These growths are but little developed in the young birds, increasing gradually until, at the age of three or four years, they are at their best.

As already remarked, the accentuation of the abnormal wattling, which cannot be called attractive, has reduced the numbers of followers of the Carrier. Those who remain

are endeavoring to increase the slim, upstanding character and at the same time reduce the extreme wattling. This seems to be the only hope of what is really a noble breed.

Carriers are found chiefly in black, dun, blue, lavender, white and pied. The iris is red, except in whites, where it is dark.

### The Barb

This bird appears to have been brought to England in much the same form as it exists today, from Mediterranean ports of North Africa. Almost throughout, except for eye-cere, it is the perfect antithesis of the Carrier, its body being cobby and its neck and legs short. The skull is usually described as " square," being short and broad. The beak is short and stout, conforming to the blunt lines of the head. What there is of it is heavily wattled. The cere is the only point in which this breed agrees with the Carrier. It is broad, flat and circular, and bright red in color. Barbs occur in black, dun, red and yellow, the eye being pearl in each case. The Barb is another once fashionable breed, which has fallen on such evil days that a good bird is now a rarity.

### The Owls

Of all the round-headed, short-billed breeds, the Owl is the least specialized, and has been thought to represent the ancestral strain of the Turbits and the Oriental Frills. The records are lost in antiquity, but at any rate it is certain that all are closely related, and had a common origin in northern Africa and Asia Minor.

All of the Owls are short-bodied, cobby birds, full-breasted and sturdy. The beak is very short and decurved, forming, with the skull and wattle, a perfect circle. The gullet, or fold of skin under the lower mandible, is well

developed, and on the breast there is a row of inverted feathers, known as the frill. The English Owl is a large bird, developed in England from the original importations. It has been greatly coarsened in recent years by crossing with Antwerps. The breed never has been popular on this side, and appears to be losing favor in England. The English Owl is found chiefly in blue, silver and dun.

The African Owl is a very small and dainty breed. It lacks the coarse clumsiness of its larger relative, with which otherwise it is identical. It is bred extensively both in this country and in England. There is a wide range of colors, black, dun, white, blue and silver being the most common. Blacks and duns pied with white are often seen, and whites with black, blue or dun tails, known as "tailed," are not rare. Reds and yellows have never been brought to the state of perfection they deserve.

The Chinese or Whiskered Owl is similar to the African, but has the frill considerably more developed and extending around the sides of the neck. It is an exceedingly pretty bird and is kept here in some numbers. In England, however, it is not popular and is almost unknown.

Owls, like all short-headed breeds, require feeders for rearing the young. Birds of moderate quality may have some success in feeding, but for really good ones the task is hopeless. The handling of feeders has already been described.

### The Turbit

Like the Owl, the Turbit is a short, full-breasted bird, of cobby build. It is small in size and also has a frilled breast. The beak is short and stout, but less down-turned than that of the Owl. The skull rises prominently in front, falling off gradually toward the rear, where it is set off by a well-peaked crest. This crest rises from a mane which

extends up the back of the neck. The gullet is well developed. The eye in all colors is large and dark, with ceres and wattle small and fine.

In color the Turbit is pure white, with only the wings colored, leaving ten flights white on each side. The colors are black, dun, blue, silver, red, yellow and various chequers. So much interbreeding has been done that many Turbits are very deficient in this respect. Most breeders make use of feeders for the young.

### The Oriental Frills

In the Oriental Frills the round-headed type has been brought to its greatest perfection. They have not only frills and crests, but complicated colors and patterns, and sometimes feathered legs as well. Asia Minor is undoubtedly the home of these breeds, many of the best birds having been imported from Smyrna. Since their first appearance, which is within the memory of many persons still living, they have enjoyed great popularity, and are now kept in this country in very considerable numbers.

The many varieties are much alike in structure, the chief differences being in the markings. All are of small size, with short, stout beaks, round heads and cobby bodies. Feathered legs and peak crests are found in some.

The SATINETTE is white, with tail and wings, except the primaries, colored. The ground color of the wings is a very pale pink, edged with a narrow band of blackish shade. These markings must be sharp and even. The tail is dark blue, each feather having a round, white spot near its extremity. The Satinette has feathered legs and a peak crest, although plain-headed birds are sometimes seen.

The BRUNETTE is similar, with grayish background and reddish lacing. The BLUETTE and SILVERETTE are clear

blue or silver, respectively, on the wings, with two white bars.

The BLONDINETTES are colored throughout, not merely in wings and tail, as are the varieties of the Satinette. They possess the full crest and boots, but have the eye reddish instead of dark. They are of many colors, such as black, dun, red and yellow, darker on the neck and paler on the wings, where each feather is marked or laced with the darker shade.

The tail feathers carry the round, white spots, while the flight feathers have an elongated, white mark, with darker edge. There are also blues and silvers, with white bars, edged with black.

The TURBITEEN is nearly white, the wings, except the primaries, being colored, as well as three circular marks on the head. The spots should be of equal size, one on the forehead and another on each cheek. It is found in most colors. The Turbiteen has the frill and boots, but lacks the crest.

The ORIENTAL TURBIT is very Owl-like, being clear-legged and plain-headed. It is remarkable for its strong head points, and for this reason is frequently crossed with most other similar birds. It is white, with wing marks like those of the English Turbit, but usually has the tail colored as well. It is found in all colors.

### The Fan-tail

The FAN-TAIL is one of the most popular and widely distributed of fancy breeds, and is well known to every one. It undoubtedly is of Indian origin, and is always to be seen in numbers in the public markets of Calcutta. It has been bred in Great Britain for many years, the Scotch devoting their energies to producing a small, round "nervy" bird with deficient tail, while the English developed a strain with

very large tails, but coarse in body and poor in action. The problem of modern breeders has been to combine the two types, a task in which they have been completely successful.

The Fan-tail of today is a small, round-bodied bird with hard, tight feathers. The head is carried far back, and when the bird is at attention it should rest at the base of the tail, thus throwing the chest into greater prominence. The head and neck are moved continually, with a nervous, jerky motion.

The tail rises nearly to the perpendicular, and should form more than half a circle, flat and well spread. Forty or more feathers have been recorded, but most birds carry several less. Evenness and freedom from breaks are of more importance than numbers. The wings should drop below the tail, without catching in the side feathers.

The head of the modern bird is smooth, although at one time crested specimens were common.

The Fan-tail is found chiefly in white, black, blue, red and yellow, although the two latter have never been brought to the same state of perfection as the others. At the present moment an effort is being made to fix the black-barred silver. There are also Saddlebacks, which have the wings colored, except for the primaries, as in the Turbits.

In the Lace Fan-tail the feathers are deficient in webbing, owing to the absence of the tiny hooklets which normally hold the barbs together. Laces are seen most frequently in white, but other colors are known.

In breeding Fan-tails there is often difficulty in getting fertile eggs, owing to the extreme nervousness and constant action of the best birds. This is overcome to some extent by clipping the side feathers of the tail or even the entire tail.

### The Jacobin

The JACOBIN represents the extreme development of the crest, and furnishes an excellent example of what can be accomplished, by careful selection, from a small beginning. It is a bird of medium size, but with the feathers very long and heavy, making it appear much larger. The body is slim and straight, with flights and tail well drawn out. The chief point is the hood, which has been brought to a state of great perfection. The feathers rise from the shoulders in a graceful curve, until they reach the head, around which they fit closely, covering the eye and beak. They extend forward, as well as backward and upward, meeting on the chest. The portion which fits around the head is known as the hood; the line from the hood to the back is called the mane, while the part that runs from the hood to the chest is called the chain. The feathers radiate from a point on each side of the neck, known as the rose. All portions must be smooth and free from breaks, the section most given to weakness being the upper part of the mane or "top."

The head is round, while the beak is short and white in all colors. The eye is white or pearl.

The standard Jacobin colors are black, red, yellow and white. The colored birds have the head, to a line running from the base of the mandibles, the flights, rump and tail, white. The greatest points of weakness in color are the chin, abdomen and thighs, which frequently are infused with white.

There are also blues, but these are still in the making. In breeding Jacobins many off colors, such as strawberry, kite, various sorts of dun, splashes, etc., frequently occur. These are often birds of great excellence in other points, and are used for crossing with standard colors.

Almond Short-faced Tumbler
Black Fan-tail

Black Shield
Bluette

Well-bred Jacobins have the sight obstructed by the hood, so during the breeding season it is customary to trim the feathers around the eyes, and also the longer ones about the vent.

### The Pouters

The Pouters are a very distinct group, apparently without close relations, in which the inflation of the crop with air, which is common in all pigeons, has been carried to an extreme. There are several breeds, in all of which the crop development is of paramount importance.

The POUTER proper is a large bird, with slender, upright body and long, slim legs. The latter are covered with feathers which lie closely until the feet are reached, where they spread out over the toes. The crop or "globe" should be as round as possible when expanded, and stand well out from the body. Narrowness of body girth, length and straightness of limbs and circular globe are the points most sought. Pouters occur in most colors, with a crescent on the crop, flights, underparts from a line just above the thighs, and primaries white. A few small white feathers, known as pinion marks, appear on the wing butts. Reds and yellows commonly have the tail white as well. The Pouter once was one of the most popular of pigeons, but has waned exceedingly of late years. Just now it is enjoying a wave of prosperity in this country, but how long this will endure is a matter of doubt.

The PYGMY POUTER is a perfect miniature of its larger relative, and should resemble it in every particular except size, which should be as small as possible. The Pygmy is a particularly vivacious and friendly little fellow, and its great popularity is readily understood.

The NORWICH CROPPER is intermediate in size between the two preceding and is clean-legged instead of booted.

It lacks the length and slimness of its relatives, but excels in crop properties. The Cropper is noted for its merry nature, and is rapidly gaining followers in this country.

### The Performing Tumblers

The Tumblers and their derivatives fall naturally into two groups: those which are bred for their flying or performing qualities and those which have lost these characters and are kept for exhibition purposes only. Since the former naturally preceded the others, we may consider them first.

The action of the Tumbler is well known to nearly every one. In its simplest form it is a single backward somersault, made in flight, and from which the bird recovers gracefully. This may be increased to two or three turns in the Common Tumbler, or a swift succession of four or more in the Roller. "What makes the Tumbler tumble" no doubt has been a moot point among breeders ever since the first bird went over, and it has never been satisfactorily settled. That it has a physiological cause, such as a defective inner ear or brain, there can be no doubt, but the problem is so clouded by what appear to be psychological questions that it will not easily be solved. At any rate, the facts remain that the bird does go over, that he does it more freely at certain times, as when flying with his mate, and that under stress of necessity, when pursued by a hawk or striving to regain his place in the kit, he flies as well as any pigeon. On the other hand, some individuals, particularly among Rollers, appear to lose entire control of themselves, and having started to roll, continue until they strike some object which stops their fall. Such birds, which are known as "roll-downs" or "mad rollers," never regain the ability to fly safely once they have lost it.

The tumbling character responds to the usual laws of

breeding, and is transmitted to the offspring in accordance with them. The young bird, almost as soon as it is on the wing, starts to drop, with its tail elevated and wings held up. It practises continually, soon getting the knack of turning completely over. The method of learning is exactly what might be expected if tumbling were merely a habit, but there can be no doubt of a fundamental cause.

The simplest form in which this phenomenon is seen is the Common Tumbler. This bird is abundant everywhere, and occurs in all colors. It is at its best flying about a garden, making its single or double turns. It will not fly for more than a few minutes at a time and is properly known as a "boy's pigeon."

From this bird, apparently, the several more advanced forms have been developed. Those which both fly and perform come under two heads: the Birmingham Roller and the West of England Tumbler. The Birmingham Roller has been particularly specialized for performing, which it does remarkably well. It makes a series of somersaults, from four or five to twenty or more, so swiftly and clearly that the eye can scarcely follow. When this is done by a kit in unison the effect is most striking.

In Birmingham, England, where the breed appears to have originated, and where it is still extensively kept, the greatest attention is given to kit flying. Competitions are held at Christmas, in which the birds are judged for twenty minutes only. All must pack together closely and roll in unison. To get a kit to do this requires great patience and rigid selection. Birmingham breeders do not approve of high flying and endeavor to keep their birds low and not too long on the wing.

In America, on the other hand, the demand is for high and long flying. That these two characters are not compatible with the best rolling is perfectly evident. Constant

performing is exhausting and a good worker must either leave a high-flying kit or become a non-roller himself. The Roller is a natural high-flyer, but if the kit is to do its best performing its flying tendencies must to some extent be checked.

The breeding, training and flying of Rollers is a fascinating pursuit, presenting many obstacles which are not easily surmounted. To get a bird that will roll a medium distance swiftly and cleanly, and still be able to maintain its position in the kit, is not an easy matter. Many advocate the mating of birds that work little to those that roll down, but this is not in accord with the writer's experience. Such matings may occasionally produce a good individual, but when this bird is used in turn its offspring are almost certain to revert to the characters of its grandparents. This, no doubt, is the reason so many "roll-downs" are produced. If such birds were never used for stock, their kind would be less common.

Young Rollers should be got on the wing as soon as they are sufficiently strong. They should not be urged, and at first will fly but ten or fifteen minutes. Any which drop out should be held in for a bit, as they will demoralize the others. They will gradually increase in time and height and soon will be going well. Young birds of some strains start rolling at an early age, others hardly tumble under six months. At any rate, when they do begin to develop they must be watched closely, to prevent the stronger birds from spoiling the others. An individual that is starting to work well will often be ruined by kit-mates which fly too fast and too long for it.

Rollers, like all flying breeds, should be taught to drop together on a given spot and to enter the loft at once. Loitering in the loft-top will ruin the best. Many fliers train their birds to come down to a "dropper," usually a

white Fan-tail. The birds should be kept hungry, so that when the Fan-tail is thrown up they quickly learn to associate its appearance with food and are not long in descending. Food is the rod that commands obedience, and through its judicious use absolute control may be maintained.

Rollers are bred in all colors and of all markings. The latter in general approach those of Show Tumblers, such as Balds, Beards, Badges, Saddles, etc., but no attention is paid to details. Both bull and pearl eyes are found, as well as clear legs and boots. Flying and rolling are the only points that interest the Roller breeder.

The West of England Tumbler has been developed for flying, as the Roller has for performing. That the two breeds are closely allied cannot be denied by any one who is familiar with both, for they cannot be distinguished by sight. The "West" is a true high and long flyer, kits having been flown for twelve hours or more. Some individuals do not tumble, but most make a single, very rapid turn. Any heavy tumbling or rolling would not be tolerated in a kit, because of the detrimental effect on the flying. The West of England Tumbler is the bird that should be used by those who favor high flying and long time, as well as a little performing. The West occurs in the same colors and markings as the Roller.

The Parlor Tumbler has the acrobatic tendency so well developed that it is unable to fly. It offers excellent evidence of the existence of a psychological factor in tumbling, for at the slightest incitement it somersaults. A good bird is not able to rise from the floor, and at the slightest effort to do so tumbles. Parlors are divided into three groups: singles, which go over once; doubles, which go over twice in succession, and rollers, which roll backward on the floor, often until stopped by an obstacle. Singles and doubles must turn cleanly, close to the floor, and without bumping

themselves. It is naturally necessary, in breeding, to have all the nest boxes on the floor. Parlor Tumblers are bred chiefly in black, dun, red, yellow and splashed.

### The Exhibition Tumblers

By careful selection and breeding a great variety of Tumblers have been evolved which are prized for various colors and markings. Such birds have, in most cases, lost the tumbling ability and are seldom given their liberty. Once despised as "boy's pigeons" they have risen to a state where they are among the most popular. Exhibition Tumblers are divided into two main groups—Short-faced and Long-faced. All varieties have at least one point in common, the white or pearl eye. The Short-faced really has a very short beak, but the so-called opposite is far from long in this feature.

The SHORT-FACED TUMBLER is the fourth of the group once known as "high-class" pigeons, and like its fellow-erstwhile favorites, has of late lost greatly in prestige. Recently it has experienced something of a revival in this country and some excellent specimens have been imported. The Short-faced is very small, in fact one of the most diminutive of pigeons. Its legs are short and the body chunky, with very full breast. The head is large and rounded, and broad between the eyes. The beak is extremely short, fine and pointed, and has the appearance of being set in beneath the bulging forehead. The little creatures are quite incompetent to rear their own young and feeders must be utilized.

Short-faces are bred in many colors, the most popular of which is still the almond. The Almond Short-face was once the most popular of pigeons and was bred in great numbers. The exact cause of its decline is not easy to name, but it is a significant fact that to produce it to perfection

is a most difficult task. It is a beautiful bird, being a rich almond-brown, spangled throughout with deep black. The flights and tail should be variegated evenly with almond, black and white. Hens are invariably weaker in color than cocks. Almonds usually leave the nest with very little spangling, then gradually becoming darker as age increases. Cocks are generally at their best after the third annual molt.

In breeding two Almonds are seldom paired together. If this be done, the progeny are seldom of the color of their parents and very often "bladder-eyed," these organs being enlarged, projecting and quite useless for sight. It is customary to mate an Almond with an Almond-bred bird of another color. Those most frequently used are red and yellow agates, which are selfs, with grizzled flights and tails; kites, or bronzed blacks, and duns. It is unusual to get more than one Almond in a nest, and cocks are more numerous than hens.

Short-faced Mottles, Balds and Beards also exist, but are now so scarce as to be almost never seen.

The Long-faced Tumbler is subdivided with regard to presence or absence of feathers on the legs, the bird being known as a "muff" in the first place and a "clean leg" in the other. In both varieties the body is short and compact, with prominent chest. The head is rounded, with well-developed top-skull. The beak is straight-set, stout and comparatively short. They are prolific breeders and excellent feeders.

Clean-leg tumblers are bred in a great variety of colors, the most popular being the selfs—red, yellow, black and white. There are also solid blues and silvers and almonds. Among the marked varieties, some are very striking. Mottles are either black, red or yellow, with a rosette of white feathers, each separate from the others, on the shoulders, and a V-shaped mark on the back. In breeding Mottles

much use is made of selfs and splashes or "gay" birds, Mottle-bred, although standard Mottles often breed well together. Rosewings are similar to Mottles, but lack the back markings.

Balds are found in most colors. The head, to a sharply defined line, starting just under the lower mandible, is white, as are the rump, tail and flights. These last should be ten on each side. The thighs and abdomen, to a straight line across the breast, should be white. Present-day Balds are very deficient in color properties, at least in blacks, reds and yellows.

Beards have the head colored, except for a white mark under the beak, which extends from eye to eye. The upper mandible is dark, the lower light. Tail, wings and underparts are white, as in Balds.

Whitesides are found only in reds and yellows, all efforts to produce blacks having failed. These are lovely birds, solid colored throughout, except for all of the wing coverts and the secondaries, which are pure white, thus making the markings exactly opposite to that of the Turbit. Whitesides are solid in color when they leave the nest, the white appearing at the first molt.

Muffed Tumblers are now very popular, and rapid strides are being made in their improvement. They resemble the Clean-legs in all, except that the legs and toes are heavily enveloped in feathers. The longest of these should be three to four inches in length, the whole being arranged in circular form. A tuft of stiff feathers, arising from just above the hock or heel, is also found in Muffs.

Muffed Tumblers occur in the usual solid colors, chiefly red, yellow, black, white, blue and silver. There are also black, red and yellow Mottles and Rosewings, also red and yellow Whitesides. Beards are marked as in clean-legs, and in muffs there are also Badges and Saddles.

In Badges the body is solid in color, except for the flights and muffs, which are white. The head markings, from which the name is derived, consist of a white bib, as in the Beard, with the addition of two small, pear-shaped markings extending downward from the lower mandible. There is also a small white dot over each eye and a narrow white stripe, known as the "blaze," on the forehead.

Saddles have the head markings of Badges, but the color on the back is confined to the scapular feathers, making a heart-shaped mark, and leaving most of the wing white. The color on the breast is cut off at a sharp line near the point of the breast-bone, leaving the entire underparts and muffs white. The rump also is white, while the tail is dark in blacks and blues, and either colored or white in reds and yellows.

### The Tippler

The TIPPLER is the high-flyer *par excellence*. Originally bred in the town of Macclesfield, Staffordshire, England, from ancestors now unknown, it undoubtedly is of the Tumbler family, many specimens still exhibiting this trait. The typical Tippler is the old-fashioned "print," a nearly white bird, with dark flights and tail, and the head and body lightly sprinkled with bronze or brownish feathers. Further crosses with Tumblers have produced dun, grizzle, blue and silver barred, and various other colors. In form the Tippler conforms in general to the type of the Clean-leg Tumbler.

Tipplers are noted for their easy, graceful wing action and the height and length of their flight. A good kit will often ascend in spirals until it is entirely lost from view, and will remain for hours at this great height. The sport of Tippler flying is exceedingly popular in England and is gaining headway in this country. The record length of time flown is

eighteen hours thirty-two minutes, made at Leicester, England, by Mr. E. Chamberlain, on June 22, 1913.

Tipplers are commonly flown in kits of three, five or, more rarely, seven birds, preferably all of one sex. The art of flying these birds, as in too many other similar sports, is more or less enveloped in mystery, most initiated persons having a decidedly mean habit of keeping their "secrets" to themselves. Many diets and methods of training are whispered from one to another, each man pinning his faith to his own system.

Young Tipplers should be treated as recommended for Rollers, except that the tumbling factor is eliminated, thus greatly simplifying matters. A very little training suffices to get youngsters flying well, and competitions are often flown with birds but eight or ten weeks old. It is essential that Tipplers be trained to a "dropper," as it often is much more difficult to get them down than to make them go up, many a good kit having been lost because of their failure to drop at night. Although, as already stated, many Tipplers tumble, such birds must be discarded, as their action interferes with the flying of the kit.

As with most other flying pigeons, Tipplers have found their way to the show room. There are now several recognized standard varieties, bred entirely for exhibition purposes, without regard to their flying ability. These show birds resemble in type the Clean-leg Tumbler, except that the head is a little less full and the beak not quite so short and stout.

There are three marked varieties. The Dark Mottle or Print is a dark chocolate color, the wing coverts evenly marked with white. The Light Mottle or Print has brown markings evenly distributed over a white ground, the flights and tail always remaining dark. The Light or Chuck is pure white throughout except for its flights and tail, and a

dark mark, deep brown in color, under the chin. The Self Tippler is a dark bronze chocolate throughout. The eyes are pearl and the beak and cere dark, in all varieties.

### The American High-flyer

The AMERICAN HIGH-FLYER or "FLIGHT" is the only pigeon breed which has originated in America. It is a handsome bird, and since it has outlived its rather unsavory early associations, undoubtedly will become popular. At present it is bred very extensively in and near New York, but is little known elsewhere.

The American High-flyer is a fairly large-sized bird, built on slim and graceful lines. The head is narrow, and the beak, which is always white, is long and tapering. The eye is an important point, being large and clear pearl, with red cere. All colors are found, the body being solid, with only ten primaries on each side white. There are also splashed birds, known as "tigers," and self whites. There are both plain-headed and crested or "capped" varieties.

The High-flyer was produced from flying birds of German derivation, but just which ones is obscure. The Brunswick Beard, however, undoubtedly took a conspicuous part. For many years these birds were used by men and boys about New York for the purpose of catching stray pigeons, flocks being trained to fly and drop at signal. Now that the High-flyer has risen to the status of a show pigeon there is no doubt of its future success.

### The Cumulet

Of high-flying pigeons, the CUMULET is undoubtedly one of the oldest. Once in great esteem in Europe, it has been all but lost sight of until within recent years, when it has

enjoyed a revival. It is a pigeon of great merit as a high flyer and it is to be hoped that it will now be restored to its former rank. The Cumulet is rather larger than a Tumbler, slender in body, and with long, narrow head and beak. The eye is noted for the unusual size and clearness of the white iris. The color is either pure white, or, more commonly, white lightly ticked with pale red.

### The Nun

The NUN, like most of the marked pigeons, is of Continental origin. Its Tumbler-like form and white eye indicate a derivation from this group, but nothing definite appears to be known. It is very prettily marked, the body being white, while the flights, tail, head, sides of neck and throat are colored. The nape carries a very large and full shell crest, which should be entirely white on both surfaces, Blacks are the best and the most numerous, but blues, duns, reds and yellows are rapidly improving.

### The Magpie

That the MAGPIE is really a modified Tumbler there can be no doubt, for within the writer's memory tumbling Magpies were frequently seen. Many of those birds were crested, but the present type is plain-headed.

The Magpie is marked somewhat like a Saddle-backed Tumbler, except that the white rump and head markings are lacking. The head and neck, breast to the point of the sternum, the scapulars, rump and tail are colored, while the remainder is white. Richness of color is a point for which Magpies are famous. Blacks excel in type, with reds and yellows a close second. Blues, silvers, duns and creams have never equaled the others, but are making rapid strides.

Once a bird of markings, the Magpie has recently become one of type. The old-fashioned birds were Tumbler-like in form, but later breeders developed a slimmer sort in which the body, limbs and neck were as slender and graceful as possible. Within the last few years a remarkable advance has been made by resorting to an extremely high-stationed French breed, the Bagadais. The advent of these "modern type" birds created a sensation in the Magpie fancy, many old-time breeders being forced to give up. The English firm which produced these birds swept the deck at shows for several years and then engaged in the profitable business of disseminating their stock. Many "modern" Magpies have been brought to this country, and once the markings have been regained will greatly improve the breed here.

### The Helmet

The HELMET, which comes to us from Continental Europe, is generally considered among the German Toy Pigeons, but it differs from them in general type, and appears to be another Tumbler derivative. At any rate, it is of Tumbler form, with round head, short, stout beak and pearl eye. It is white in general, with the tail and the head, to a line starting from the juncture of the mandibles, colored. The upper mandible is dark, the lower white. Helmets are found in all colors, and there are both crested and plain-headed varieties.

### The German Toy Pigeons

The GERMAN TOYS are so called because of the fact that their characteristics are chiefly those of color and markings, rather than of structure, thus making them more easily bred. In body they are of the Rock Dove type, with narrow heads

and thin beaks. In markings and color they present a wonderful diversity, comparable only with the Oriental Frills. Most of the best known Toys are very heavily muffed, although some are clean-legged. To describe all here would require more space than is available and only a few of the most common will be mentioned.

The SWALLOW is a typical Toy, with long body and short legs, the latter being very heavily muffed. The head carries a wide shell crest. The markings consist of colored crown, wings, except for the scapulars, and muffs. There are many colors, including blues, either solid or with black or white bars, blacks, solid or white-barred, reds, yellows and various spangles and chequers. The Fairy or Spot Swallow is similar, but has the color on the head confined to a small spot on the forehead.

The SHIELD somewhat resembles the Swallow, but is plain-headed. It is white throughout except for the wing coverts and secondaries, which are colored, as in the Turbit. Blacks, blues, reds and yellows, with white bars, are the most abundant.

The ICE PIGEON is of similar type, but has no white markings. The most common ones are of a peculiar pale lavender tint, not seen in any other pigeon. This color extends over the entire bird, being uniform throughout. White-barred, spangled and laced varieties are also bred.

The HYACINTH is like the foregoing in body, but is clean-legged. It is of a blackish-blue color above and below, the wing coverts being of a pale brownish cast, with fine, dark markings. Most of the Toys are represented in this country by a few pairs in large collections. Some, however, as the Swallows, are extensively bred.

### Miscellaneous Breeds

Under this head we may briefly consider a few of the less well-known breeds which are worthy of mention.

The SCANDAROON is a large, rather ungainly bird, with a long, down-curved beak. Markings are as in the Magpie, except that the head and upper neck are white, save a small oval patch below each eye. There are also solid colored birds. This is an ancient breed, which has been much used in the foundation of modern races, such as the Show Homer and the Magpie.

The ARCHANGEL has no structural peculiarities, its form being much like that of the common pigeon, except for a very sharp, high crest on the head. The back, wings and tail are metallic black, the remainder of the body being either a dark, reddish bronze or a paler, yellowish shade. The breed is noted for the richness and brilliancy of its plumage, points in which it is unexcelled.

The RUSSIAN TRUMPETER is remarkable for its curious voice and profuse feathering. It is a large-sized bird of low stature. The head bears a heavy rosette, which radiates in all directions from the center, as in the Crested Canary, while on the nape is a well-developed shell crest. The legs are very heavily feathered. In color there are blacks, whites and mottles.

The FRILLBACK is of the common type of body, the legs being lightly booted. Its distinguishing character is found in the wing coverts, which are curled or frilled. Frillbacks are bred in all colors, and just now are popular in this country.

### Utility Breeds

Under this head may be grouped a number of pigeons of diverse appearance, but generally agreeing in their large

size. All are essentially utility birds, but they are now being adapted to show-room standards.

The RUNT, contrary to the suggestion of its name, is the largest of pigeon breeds, good specimens often weighing two and one-half pounds. The bird is of the common pigeon type, but is so enormously enlarged that its body, head and beak appear comparatively stout. Runts have been much used by squab breeders, but the present tendency seems to be toward Runt crosses or the smaller breeds. Runts are found in all solid colors.

The HEN PIGEON, while considerably less than the Runt in size, is a large bird. It is curiously shaped, the body being short and the narrow tail pointing upward. The neck is long and parallels the tail, giving a curious effect. The old-type birds are now becoming more refined and slender. Hen Pigeons occur in all the solid colors.

The CARNEAU, while large in size, is still very active. It is rather reachy in neck and limbs, but retains good body size. This breed has been much favored by commercial squab producers because of its unusual ability as a producer of large numbers of heavy squabs. Carneaux are bred chiefly in solid red and yellow, also mottles and rosewings.

# SECTION III

# THE AQUARIUM

## CHAPTER XIII

## GENERAL CARE

WHAT normal family has never included among its varied possessions a tank of goldfishes? The goldfish is almost as ubiquitous as the canary, but unfortunately there has existed an almost universal lack of knowledge of the proper care of this creature, and the first disastrous attempt at keeping it is almost invariably the last. Just why this condition should exist is not easy to say, as the needs of the goldfish are simplicity itself. Perhaps the dealers are responsible, in a way, for it is to them that the tyro looks for advice as to his new acquisitions. Very often, no doubt, help is not solicited, the purchaser taking it for granted that his crystal globe is the acme of perfection by way of a habitation, and well suited to the comfort and exhibition of its inmates, if only the water be changed daily! What drudgery has been caused by this fallacy, and what secret thanks have gone forth when the heavy globe finally has been dropped, or otherwise broken, on one of its many trips to the nearest tap!

But understanding of the aquarium is spreading. Almost every large city has its Aquarium Society, composed of enthusiasts who devote their spare time to the cultivation of aquatic life. Dealers are acquiring information, and are learning that more is to be gained by offering their patrons facts than by withholding them. Many schools maintain balanced aquaria, so that the students are able to learn something of modern methods. Thus the truth about the aquarium is being disseminated among the public, and the effect is already discernible.

The popularity of the goldfish in the home is attested by the many thousands sold yearly, at something less than popular prices. Conceive a glass bowl, five inches in diameter, equipped with a handful of gravel and a spray of sickly aquatic plant, and inhabited by two infantile goldfishes, the whole offered for sale for ten cents, with a food wafer or two thrown in! Consider, also, the untimely end of these unfortunates, condemned by a combination of ignorance and sincere love of the beautiful.

Yet the picture has its bright side. The amazing eagerness with which these little bowls are bought shows a widespread desire for something alive, and only a little knowledge, properly applied, is necessary to develop a really humanizing movement. In all of the list of creatures commonly kept in the home, there is none which will thrive as well, with so little care, and give so much pleasure and satisfaction, as the goldfish. Once the simple principle of the balanced aquarium is understood, the way is opened to a vast field of interest and instruction.

As the fish draws the water through its gills, oxygen passes into the blood and, in circulating, combines with waste products of the tissues, and is expelled again into the water in the form of carbon dioxide, a poisonous gas. Thus it is that the water of tanks which are deficient in plant life soon becomes vitiated and must be renewed to save the lives of the inmates. But if the aquarium is supplied with growing plants this trouble is overcome. Carbon is exactly what the plant requires for its own growth, but it has no use for oxygen. Hence, having absorbed the gas through its leaves, it retains the needed element and returns the oxygen to the water. Thus is the water constantly kept aërated, and suitable for the maintenance of animal life. An aquarium of correct shape, placed in a favorable position, and stocked with a suitable number of fishes and healthy aquatic plants

sufficient to provide them with oxygen, may remain untouched for years, except for the occasional removal of sediment and the addition of water to replace that which has evaporated. This evaporation has a decidedly beneficial effect upon the air of the room in which the aquarium is placed, especially in modern steam-heated apartments, which invariably are lacking in moisture.

Besides the goldfish there are many interesting denizens of our own ponds and streams which will live well in the aquarium, and a great number of foreign fishes, mostly tropical, which represent an amazing range of variation in form, color and habit. These last are more difficult to care for than the common varieties of the goldfish, but a very little experience suffices, and their much greater attraction more than compensates for the slightly increased effort necessary to keep them in health. While some of these fishes will be referred to later on, space forbids mention of them all, but the reader is assured that a pursuit of great scope and fascination awaits him who cares to specialize in these forms.

### The Aquarium and Its Care

The globe above referred to, aside from its small size and improper equipment, is an abomination from its shape as well. No matter how large, a vessel of this sort, because of the small surface of water exposed, is never properly aërated; and, moreover, so distorts the fishes that their true size and proportions remain entirely unknown to the observer. Cylindrical tanks are much better, if not more than two-thirds full of water, and aside from a certain amount of distortion, are perfectly satisfactory. The most suitable shape, however, is the square or rectangular. Tanks of this sort may be had made entirely of glass, but while these are attractive, they are expensive and easily broken.

Probably the most satisfactory is the glass aquarium with a frame of metal. The cheaper grades have metal bottoms as well, but the best and most serviceable are floored with slate. Tanks of this sort are not at all difficult to make, but the beginner might much better invest in the excellent offerings of dealers in aquaria. There are many recipes for aquarium cement, but their mixture is a matter calling for some skill, and if the amateur pisciculturist essays the manufacture of a tank, or repairs are required, it is much better to secure a packet of suitable cement already prepared.

In placing the aquarium, there are certain rules to be observed. If they are to thrive, the plants must have a varying amount of light, according to their habit, some requiring more than others, but direct sunshine during the summer months is most undesirable. In the first place, it overheats the water, causing it to give off oxygen, thus often imperiling the lives of the inmates. Most plants will not do well under such conditions, and the growth of undesirable algæ is certain to be caused. For these reasons, a strong north light is the most suitable for the aquarium, which should be placed in or very near a window. During the winter a little sunshine during the morning is desirable, and for this purpose an eastern exposure is best. Sunshine at this time will serve to warm the water slightly, and will stimulate the plants to a proper activity. If a southern or western window is the only one available, the aquarium may be protected to some extent by the introduction of an opaque fender, such as a piece of cardboard, between it and the light. A tank fully stocked is heavy, and its support should be well looked to.

A piece of glass should cover the top of the tank, under any circumstances. If it fits tightly, leaving no air space whatever, it will be found a world by itself, evaporating water condensing on the glass top, and returning like natural

dew. Dust is entirely excluded and many delicate aquatic plants will be found to thrive much better. It also prevents the possibility of loss of leaping fishes, a habit to which most species are subject. For the sake of benefiting the atmosphere of the room, however, it is often desirable to have the glass cover short enough to leave a narrow space at the ends, or to have it slightly raised all around. In this case it will be necessary to add fresh water at intervals, as evaporation takes place.

If a green growth of algæ gathers on the sides of the aquarium, it may be removed from the side facing the room by rubbing with a piece of cheesecloth, or other coarse material, attached to the end of a stick or long pair of forceps. The only objection to the presence of the algæ is that they obscure the vision. In fact, they are decidedly beneficial, acting as aërators, and also furnishing food for the fishes.

All dead portions of plants should be removed, and sediment at the bottom should be taken out by suction with a glass tube, obtainable in drug or aquarium supply stores. If these matters are carefully looked after, and there is a proper balance between plant and animal life, it will not be necessary to dismantle and thoroughly clean the aquarium except at very long intervals.

### Stocking the Aquarium

In stocking the aquarium, the first consideration is a covering for the bottom. For this purpose a mixture of sand and fine gravel is generally the best. It should be washed and rewashed with great care, until all soluble and floating matter has been eliminated, and the water remains perfectly clear. It should then be placed in the tank to a depth of one or two inches, according to size. It is best to

slope it gradually from back to front, and toward one corner. This aids observation, and causes refuse to gather at the lowest point, whence it may easily be removed with a rubber siphon or glass tube. The most desirable aquatic plants derive their nourishment directly from the water, so that the gravel's chief function, as far as the plants are concerned, is simply to hold them in position. Lilies and certain other delicate plants require soil and may be set in small pots, with the soil covered with gravel.

Small tanks should not be obstructed with rockwork, but if something of the sort is desired, it is best constructed of natural stones, in the form of arches, bridges, etc. Artificial castles, images and other articles of the sort are in decidedly doubtful taste, and will not be used by the discriminating.

The plants with which the aquarium is to be stocked have much to do with its ultimate success, and should be selected with the greatest care. The aquarist who lives in the country or suburbs will get much pleasure from collecting them himself from neighboring ponds or streams. Almost any submerged aquatic plant found growing naturally will thrive in the aquarium, and a little experience will quickly demonstrate the few which will not. If the beginner is not so fortunately placed, he must depend on the dealer for his supply. Curiously enough, the plant most commonly kept by dealers is one of the most unsatisfactory in the aquarium. This is Fanwort (*Cabomba*), of which there are several species. All are difficult to keep healthy except under the best conditions, but if they must be used, the bundles in which they are sold should be separated, and each sprig should have from one-third to one-half of its base removed. Each should then be planted separately.

The best plants for the amateur are the Swimming Arrowwort (*Sagittaria natans*) and the various species of Waterweed (*Anacharis* or *Elodea*). The former is somewhat

grass-like in appearance, but with broad, strong leaves. Once it has become established in the aquarium, it sends out shoots which develop rapidly. It is a good aërator, and probably the most satisfactory of all aquatics. *Anacharis* is a long, stringy plant, having three or more small, narrow leaves arranged in whorls at frequent intervals along the stem. It is extremely hardy and a good aërator, its greatest fault being the rapidity with which it grows, necessitating its frequent trimming back.

Tapegrass (*Vallisneria spiralis*) is another valuable aquarium plant. It much resembles *Sagittaria,* but its leaves are more narrow and ribbon-like, and it has a somewhat different habit of growth. It is a good aërator and propagates well.

Certain species of False Loosestrife (*Ludwigia*) are attractive if they can be established. They are rather delicate in the aquarium, but if not too badly crowded, and given plenty of light, will often thrive.

The Pondweeds (*Potamogeton*) do not, as a rule, make satisfactory additions to the aquarium flora, although they are sometimes offered by dealers. When secured in this way, the delicate leaves are almost invariably injured, and as even healthy plants will thrive only under the most favorable circumstances their acquisition is not advised.

There are many small floating plants which, while their value as aërators is almost negligible, add greatly to the beauty of the aquarium. Of these the Duckweeds (*Lemna*), Moss-ferns (*Salvinia*) and Floating Riccia (*Riccia* or *Ricciella*) are the hardiest and most easily obtained. The Bladderworts (*Utricularia*), while always submerged, float close to the surface. Their bright green traceries make them attractive, but they should never be kept in the breeding aquarium, as the tiny " bladders " are traps from which

newly hatched fishes cannot escape, although they may enter freely enough.

After the plants have been selected, and before they are placed in the aquarium, they should be immersed in solutions of salt, creolin, potassium permanganate or other sterilizing agents, the action of which will not destroy their tissues. This will serve to destroy any harmful parasites, fungus spores, etc., which might otherwise be introduced into the tank. After they have been removed from the sterilizer, the plants must be rinsed thoroughly in clear water, to remove all traces of it from the foliage.

The plants used should be grouped according to their needs as to light, etc., and set before the tank is filled. When they have been arranged, the water should be added with great care, to avoid disturbing them. This may be accomplished by means of a small sprinkler, or by pouring the water in a piece of paper free from print. After the completed aquarium has stood for a day or two, to insure an equable temperature and proper aëration, it is ready for its occupants.

One inch of Goldfish to each gallon of water is the safest proportion for the permanent tank.

Besides fishes, certain other creatures form part of the balanced aquarium. The most important of these are the snails, which, besides the added interest of their presence, serve a useful purpose as scavengers, and removers of the ever-present algæ. There are many species, all of which are more or less suitable for the aquarium. Some feed largely on the plants, but when these are in a healthy growing condition the slight depredations of the snails are negligible, and more than overbalanced by the services they perform.

The most common native species are the Pond- or Mud-snails (*Limnæa*). The most abundant form is a small, blackish creature, found in ponds and ditches everywhere.

It is somewhat destructive to plants, but a few specimens will not injure vigorous growths.

The species of *Planorbis,* the Trumpet-snails, are more desirable. There are a number of native species, and the common European form is usually obtainable from dealers. There is also an albinistic variety of this snail which is much in demand among aquarists. The fleshy parts and shell, especially in younger specimens, are bright red in color, and they are very effective among the green foliage of the aquatic plants.

The Pond- and Trumpet-snails propagate by means of eggs, which are deposited in masses on the plants or sides of the aquarium, enclosed in gelatinous capsules. If undisturbed, these hatch in about two weeks, according to the temperature of the water. All fishes large enough to do so will feed voraciously on the young snails, and some will attack the eggs, so that few are generally reared in the aquarium. If the eggs or young, or, better still, the breeding snails, are removed to a small tank or jar where they will not be disturbed, large numbers may be reared without difficulty. The young should be fed on tender leaves of lettuce and fine fish food.

The larger snails of the genus *Paludina* are harmless to the plants when the supply of food is sufficient. They may be distinguished from the preceding species by the possession of an opercle, with which they are able to close the opening of the shell. In these snails the eggs, after fertilization, are retained by the female, the young finally emerging fully equipped with shells and large enough to escape the attentions of all but the strongest fishes.

One or two tadpoles should always be kept, as much for the interesting metamorphoses through which they pass as for their value as devourers of refuse and algæ. Tadpoles of the common Green Frog are the most desirable.

Some aquatic insects, such as the Water-strider and Whirligig Beetle, may safely be kept in the aquarium, but it is best to avoid the larger and stronger species, many of which will attack and kill the fishes. Dragon-fly and other larvæ must not be introduced, as they are among the most destructive enemies of young or small fishes.

Turtles and crayfish are interesting and will thrive if properly treated, but must not be kept in the general aquarium. Even the smallest specimens will attack the fishes, killing the weaker ones and tearing the tails of those strong or active enough to escape them.

### Diseases

Unfortunately, in common with other captive creatures, as well as those in freedom, fishes are subject to a variety of diseases. These are not numerous, and the most common are caused by fungi or animal parasites. If proper care is used in the introduction of plants, attacks of this nature are infrequent. When they do occur, the best course to pursue is to remove and destroy the entire contents of the infected tank, purify it thoroughly and restock it.

If fishes are carelessly handled scales will be loosened or removed, rendering the specimen subject to attack by fungus, the spores of which are ever present in the water. The result is the appearance of a milky, stringy cloud which adheres to the victim and moves about with it. When this is noticed the fish should be removed, and immersed for a short time in a weak solution of salt in water. After this treatment has been repeated two or three times, improvement will be noted, and a full recovery may finally be achieved, but once the fungus has penetrated beneath the scales it is difficult to eradicate.

The so-called black fungus is a common disease among

newly imported goldfishes. It is caused by animal parasites, the presence of which is shown by dark patches on various parts of the victim, covering open sores. Treatment is almost hopeless, and if solutions of salt, potassium permanganate or other germicides are of no avail, it is best to destroy the fish and overhaul the aquarium.

There are a great many animal parasites which are destructive to fishes, the worst being an infusorian known as *Ichthyopthirius*. The first indication of the presence of this parasite is the appearance of small, round, whitish spots which gradually spread to other parts of the fish's body. The victim becomes greatly emaciated and dies within a few days. Many methods, such as the usual immersions, heating of the water to 90° Fahrenheit, etc., have been tried to little purpose, and very few cures are effected.

It is pertinent to note at this point that when fishes must be removed from the tank, they should always be caught in a net of coarse cloth. They should never be lifted in metal strainers, or in the hand, as it is almost impossible to avoid injury, slight though it may be. Carelessness in this respect is often the primary cause of serious loss.

It is important, also, that the temperature of the water in which a fish is to be placed be the same as that from which it came. This is an important point, especially with delicate species, and lack of observance may cause severe losses.

After all is said and done, the tyro's safest course is to keep the aquarium clean and take every possible precaution against the introduction of disease. A sick fish is a difficult subject, and a fresh start is usually the only means of relief.

## CHAPTER XIV

## AQUARIUM FISHES

### The Goldfish

THE most popular aquarium fish is, of course, the GOLDFISH (*Carassius auratus*). Small examples of the common variety may be had for as little as five cents each, but when the more valuable sorts are reached it is possible to invest many hundreds of dollars in a few specimens. The modern goldfish was produced by careful selection of albinistic individuals of a member of the carp group. Most of the work of developing the many varieties has been done in Japan and China, whence we have received some really wonderful fishes.

Goldfish of the better varieties are found in the usual scaled condition, and also with the scales so thin and delicate that they are almost invisible. Fishes of this type are known as transparently scaled or "scaleless." They are somewhat more sensitive to cold than the normally covered breeds, but otherwise are equally hardy.

The SHUBUNKIN is a variety of the common goldfish, at least in form. It is transparently scaled and very strikingly colored—a mixture of black, blue, purple and reddish blotches, usually on a whitish background. The Shubunkin has only recently been brought to this country from Japan, and just now is deservedly popular.

The most simple modification in form is noticed in the breed known as the COMET, which has the body of a common goldfish, somewhat elongated, and with all of the fins and the tail greatly lengthened. It is pretty and graceful as

Common Goldfish

Scaleless Telescope Goldfish

Japanese Scaleless Veil-tailed Goldfish

*Haplochilus cameroonensis*

well as hardy, and well suited to the needs of the beginner.

Then comes the group, including practically all of the most remarkable varieties, in which the tail and also the anal fin are in duplicate. With most creatures, when abnormal repetitions of parts occur, the individual is unable to survive. In the goldfishes, however, the probably fortuitous appearance of monsters has led to the development of the finest breeds.

The JAPANESE FAN-TAIL is the simplest representative of this type, and is always obtainable from dealers. It is not in good repute among breeders of fancy fishes, as many of the specimens are simply degenerates of more advanced forms. Nevertheless, it is frequently very handsome, and is always popular with the tyro. The two tails should be well separated, and not joined at the edges of the upper lobes, as is often the case.

This fish undoubtedly was the forerunner of the truly lovely JAPANESE VEIL-TAIL, a breed in which the tremendously developed double tail is produced to a great length and width, and droops downward like folds of gossamer. Like all of the following varieties, the Veil-tail should have a short, egg-shaped body, with the dorsal fin carried well up.

Beside the Veil-tail proper, there are two minor subdivisions, separated by the shape of the tail extremities. The typical form has a slight notch. When this depression is entirely wanting, the fish is known as a Square-tail or Broad-tail. A very deep incision makes the specimen a Ribbon-tail or Fringe-tail. This is really the finest of the goldfishes, since it is of surpassing grace and beauty, and has not been marred by the hideous extremes to which some others have been carried.

Having brought the development of the fins to a point approaching perfection, Oriental breeders seem next to have turned their attention to the eyes, with a result which

certainly is not pleasing to the uninitiated observer. The fishes of this group are known as the TELESCOPES. Their eyes protrude surprisingly, being entirely outside the skull proper, and should be cylindrical in shape, never globular.

The Telescopes are found in all the variations of tail, scales and color that are seen in the Japanese varieties. The most popular color seems to be the curious pattern of the Shubunkin, known among Telescopes as calico. One of the finest is the Black or Moor, which is a rich and startling bluish-black. Unfortunately, this color is not always permanent, especially among American-bred fishes.

The extreme pinnacle in the exaggeration of the goldfish is reached in the CELESTIAL TELESCOPE. This fish is of an amazing ugliness, the protruding eyes being so turned that they can gaze only upward. It also lacks the dorsal fin, and the tail is double but frequently not lengthened. Altogether it furnishes an excellent example of the fact that variations of domestic creatures often are carried far beyond the commonly accepted bounds of beauty. Still, this fish will appeal to lovers of the grotesque, and as a monument to the breeder's skill it stands supreme among the fishes. The direction of the staring eyes is decidedly suggestive, and only thoroughly initiated breeders regret the fact that the secret of reproducing the Celestial Telescope has not yet been revealed to breeders outside the Orient.

The latest arrivals from Japan are the LION HEAD and its cousin, the ORANDA. The former is the more popular, from $25 to $100 each being asked for really good adult specimens. The Lion Head is a rather large fish, rounded and massive in body. The tail is divided but short, and there is no dorsal fin. In color it is either gold or pearl, with bright red head. The scales are coarse and heavy. The characteristic feature of the breed is seen in the head,

which is covered with a protuberant, fleshy growth, extending down over the cheeks. This hood appears when the fish is about eighteen months old, and reaches its greatest development in about two and one-half years.

Only within the last year or two have American breeders been able to produce good young of this form, perhaps because of the scarcity of suitable breeding stock. All of the best adults now seen are imported fishes, but it is hoped that within two or three years domestic specimens will have developed sufficiently to equal them.

The Oranda is very similar to the Lion Head, but differs in possessing a heavy veil tail and a well-developed dorsal fin. The hood is less pronounced, but this may be merely individual, as the Oranda is not yet so well known as the Lion Head.

Goldfishes are easily kept if properly fed, and are not difficult to breed. The chief point in feeding all fishes is not to give more than is taken at once. If any remains, it should be carefully removed. No hard and fast rules for frequency can be laid down, but the fishes should be fed once or twice a day, according to their willingness to partake. Like all of the carps, goldfishes are chiefly vegetarians, and the bulk of the food should be of this nature. The white wafers commonly sold as goldfish food are most undesirable, as they contain little nourishment and discolor the water.

Excellent foods, mostly of German origin, are sold by all dealers. They are composed of proper mixtures of natural animal and vegetable food, and are well calculated to sustain life. Goldfishes will also take boiled cereals, ants' "eggs," dry or fresh, bits of chopped clams and worms, and almost any insects small enough for them to swallow.

Those who care to take the trouble, or are unable to

secure suitable food, can easily manufacture their own. White and graham flour and various cereals may be mixed with finely ground dried shrimp, ants' eggs, or other animal food, and beaten up with a sufficient quantity of fresh eggs. A small amount of table and Epsom salts should also be added. No set formula can be given, as the constituents are varied according to the needs of the fishes kept, but the proper proportions are easily determined. The dough is then baked, thoroughly dried and ground to the desired size. Food suitable for the needs of every aquarium fish can be made in this way, and it will keep indefinitely.

The goldfish breeds in the spring, and when one or two individuals are observed driving another about the tank constantly they should be placed out of reach of interference by non-breeders. The eggs are small, clear globules, which are attached singly to the plants by the female, and there fertilized by the male. After they have been deposited, the fishes should be removed, as they will eat the eggs if allowed to remain. Tadpoles and snails will destroy them also, and must not be kept in the breeding aquarium. The eggs, at a favorable temperature, will hatch in about three days, the young being extremely minute, and with large egg sacs attached. They will keep very quiet for a few days, but soon begin to move about the aquarium, feeding on the protozoans, chiefly infusoria, which swarm among the plants. If the fry are numerous, the supply of food will soon be exhausted, and can be renewed by placing a bundle of hay or aquatic plants in a jar of water. In a few days the water will be full of tiny creatures, many visible to the naked eye in the proper light. They may be poured into the aquarium as needed. A little dried lettuce thrown into the tank will produce protozoa, and there are prepared substances which serve the same purpose. The young fishes will soon take small crustaceans, such as *Cyclops* and young

*Daphnia*, which can be secured in any pond, especially if there are no fishes there. Care must be taken, however, not to place these creatures in the tank until the fishes are large enough to eat them, as otherwise the operation will be reversed. The fry should be induced to take dry food as soon as possible, and from then on there is little difficulty. Certain individuals will grow much faster than others, and as they develop should be sorted out. If the fishes are of the more valuable varieties, the better ones may be determined at an early age, and should be segregated and given special attention.

### Native Fishes

A great variety of undomesticated fishes are available for the aquarium, and generally are far more interesting than the sluggish goldfish. Many are perfectly hardy, while others require special care and should not be attempted by the inexperienced. Let us first consider the inhabitants of our own ponds and brooks.

The minnows, or the "minnies" of childhood, are the most numerous, and include many attractive aquarium fishes. They belong to the carp family (CYPRINIDÆ) and abound in fresh waters throughout the north temperate zone, about two hundred and twenty-five American species being known. Of these the SHINER (*Abramis chrysoleucus*) is one of the hardiest and handsomest. It is found in quiet water everywhere east of the Rockies. The Shiner is a brilliant silvery fish, the male becoming more brightly colored during the breeding season. It lives in schools, and several individuals should be kept together in a fair-sized tank. It will eat dry fish food, small bits of scraped raw meat, earthworms and insects, and may be kept safely with goldfishes.

The BLACK-NOSED DACE (*Rhinichthys cataractæ*) is a smaller fish than the preceding, and easily distinguished by

the heavy black line which extends from head to tail on each side. It is found in cold, swift streams, but rapidly adapts itself to life in the aquarium, of which it is a most desirable inhabitant. It is always active and forms an agreeable contrast to the goldfish, with which it may be associated. The ordinary prepared foods, with occasional insects, will suit its needs.

There are numerous other beautiful species of dace found in America, many of them suitable for life in captivity. A few, however, some of them, unfortunately, among the most lovely, are extremely delicate, and almost impossible to keep without running water.

Chubs, Horned Dace and small specimens of the many species of Suckers and their allies all live well in the aquarium, but are less interesting because of their comparative inactivity. They will do well on the same food as that given the goldfish.

There are several European species of the carp family which are attractive in the aquarium. The Golden Orfe is an albinistic derivative of the Orfe or Ide (*Idus idus*), established by careful selection by breeders. It is yellow above, with whitish sides, and of active habit. Small specimens make excellent tank fishes, but under favorable conditions will grow to a length of more than a foot.

Although the Tench (*Tinca tinca*) is a favorite food fish in Europe, the smaller individuals make excellent aquarium pets. The typical form is metallic green, but an albinistic variety, known as the Golden Tench, has been produced in captivity and is an ideal tank fish. It is bright yellow, slightly spotted with darker color, and is active and hardy. All of the above species may be kept with goldfishes, and will thrive on the same food.

Catfishes and small Eels are interesting captives, but must not be kept with goldfishes or other delicate forms

because of their voracity. Young Eels are especially attractive. During the spring they may often be met with in great numbers, ascending streams after their babyhood spent in the sea, where the adults go to breed. In the aquarium they will burrow in the sand, with only the head exposed, and lie thus concealed for hours. Catfishes and Eels are not delicate feeders, and will do well on almost any diet, in which animal food should predominate.

The great group of PERCOIDEA, or Perch-like fishes, contains many aquarium favorites. The various species of SUNFISHES—Common, Black-banded, Long-eared, etc.—are well distributed and some sort is obtainable by every one. Specimens of good size are best kept singly, or in pairs if they will agree. They quickly become very tame, and soon learn to look forward to feeding time. They should be fed chiefly on chopped worms, bits of meat and clams, and live insects.

The DARTERS, distant relatives of the Sunfishes, are brilliantly colored little fellows, of which more than fifty species are known. They are among the most beautiful of fishes, and it is to be regretted that they do not thrive better in captivity. The Tessellated Darters (*Boleosoma*) are probably the best known. They inhabit swift streams, lying among the stones on the bottom, springing into activity only when prey appears. In the aquarium they should be kept in cool, shallow water, and fed as much as possible on live food, with whatever else of the usual items they can be induced to take.

The STICKLEBACKS belong to the family GASTEROSTEIDÆ, and are widely distributed throughout the Northern Hemisphere in fresh and brackish water. They are variously named—two-spined, three-spined, etc.—according to the number of dorsal projections. Specimens can be taken in almost any clear brook or pond, and most dealers can supply

them, especially in the spring. They are exceedingly destructive when at large, being very persistent in the devouring of the eggs and fry of other fishes. Their breeding habits, however, are most interesting and may easily be observed in the aquarium. When the season for reproduction is at hand, the male selects a proper site among the aquatic plants, and there builds a fairy mansion of tiny bits of plant material, cemented together with a glutinous secretion from an abdominal gland. There are two entrances, and after he has induced the female to enter and deposit her eggs he proceeds to fertilize them, and then stands guard. The female should now be removed, to save her from the attacks of her mate, who keeps up a continual fanning, forcing a current of water over the eggs. After about two weeks his zeal will be rewarded by the appearance of a great crowd of little ones. He is the best of fathers until the young begin to move about the aquarium, when he no longer recognizes them as his own and must be removed. The young feed at first on protozoans, and later will take small crustacea and prepared foods.

Adult sticklebacks are too pugnacious to be kept with other fishes. They are hardy, and should be fed chiefly on animal food, although they will take artificial preparations.

### Tropical Fishes

We come now to the fishes of the tropical and subtropical waters of Asia, Africa and America. They exist, of course, in almost endless variety, and comparatively few are known among aquarists. Their cultivation has been carried on for years in Europe, and more especially in Germany, where great proficiency in their care and propagation has been attained. It is only during recent times that they have received attention from American fish-keepers, but their

popularity is rapidly increasing. Many aquarium societies have been formed for the importation of specimens and the dissemination of knowledge concerning their care. Every large city has dealers who specialize in fishes of this sort, and a little investigation will reveal their whereabouts.

Many of the tropical species are of surpassing beauty, and there is a great range of curious breeding habits. They are by far the most fascinating of aquarium fishes, and most are really no more difficult to maintain in health than goldfishes. The chief requirement is a uniform temperature, ranging from 60° to 75° Fahrenheit. Tanks are made with heating apparatus attached, and these may be useful at times. Ordinarily they are unnecessary, except for very delicate fishes, for once they have become well acclimatized most species are very hardy, if a steady warmth is maintained.

Unfortunately, most of these fishes, like many plants, especially the orchids, have not yet been given suitable common names, and are known by their scientific appellations only. A little application, however, will overcome this difficulty, and the amateur soon speaks them as glibly as the most hardened expert. Perhaps the most interesting group is the Pœcilliidæ, or Killifishes. About two hundred species are known, and are divided by aquarists into two groups: oviparous, or egg-laying forms, and viviparous, in which the eggs are retained within the body of the parent until they are fully formed, and the young able to care for themselves when emitted.

Of the egg-laying group, the species of the genus *Fundulus* are very numerous, and extend from Maine to Central America. It is represented on the eastern coast by a number of well-known species, some living in brackish water. The Common Killifish (*F. majalis*) and the Fresh-water Killifish (*F. diaphanus*) are very abundant, and will live

well when established in the aquarium. *Fundulus chrysœtus* is perhaps the most beautiful of this genus, and is a most desirable aquarium fish when it can be procured. It is very abundant in ponds in our southern states, and its scarcity in the New York market is difficult to explain. The species of *Fundulus* will thrive on the usual preparations, but should have as much live food as possible.

The genus *Haplochilus* contains some of the most brilliantly colored fishes known to the aquarist. The males especially are remarkably handsome, and possess various embellishments of the tail and fins which add greatly to their beauty. *H. cameroonensis*, a comparatively recent arrival in America, is the most brilliant species so far imported, but many exceedingly fine forms have not yet been introduced here. *H. rubrostigma, H. chaperi, H. panchax, H. scrfasciatus* and *H. latipes* are the best known species, and all may be recommended. None is especially delicate, but the water should not be less than 70° Fahrenheit. The eggs are attached to the plants of the aquarium, which should be thick and bushy. After spawning the fishes should be removed. The fry when hatched are very minute, and will feed at first on protozoans and tiny algæ. Later they may be given crustacea and prepared foods. The adults do very well on good prepared foods and chopped earthworms, but should have *Daphnia* and *Cyclops* as often as possible.

The species of *Rivulus* somewhat resemble those of *Haplochilus* in general appearance, but are much quieter in coloration, and do not have decorative appendages. Few species are known, all from Central and South America. *R. ocellata, R. flabellicauda* and *R. pœyi* are the forms most familiar to aquarists. They are fascinating fishes, the soft colors being very harmoniously blended. Their breeding and feeding habits are much the same as those of *Haplochilus*, but they are expert climbers, and able to live for

*Xiphophorus hellerı*

*Alfaro cultratum*
Male above, female below

Paradise Fish

Climbing Perch

some time out of water, so their tank must be kept carefully covered.

The viviparous group of the PŒCILLIIDÆ includes what are probably the most attractive species of the family. The fact that active, independent young are brought forth at surprisingly short intervals, and that they are not at all difficult to rear, ensures their lasting popularity. There are many species, of varying colors, but all may be known by the anal fin of the male, which ends in a needle-like process, used as an intromittent organ. In most species the male is much smaller than the female.

The most commonly kept species, and probably the best for the beginner, is *Acanthopthalmus* (*Girardinus*) *guppyi*. This diminutive fish is a native of Trinidad and Venezuela, and has been introduced in Jamaica and various other West Indian islands because of its value as a destroyer of mosquito larvæ. The males average three-quarters of an inch to an inch, and the females up to two inches. The latter are very plainly colored, but the males are extremely brilliant, presenting an amazing variety of patterns in metallic greens, reds, blues and blacks, no two being exactly alike. Most live-bearers are inveterate devourers of their own young, but this species is not nearly so badly disposed toward its offspring as most, and if the aquarium is well supplied with vegetation a great many can be reared with little difficulty. In case it is desired to save all of the young, however, it is best to isolate prospective mothers, which are easily distinguished.

Most keepers of live-bearing fishes have their own methods for insuring the safety of the young. Various appliances are in use, ranging from small metal cages to glass funnels, all intended to confine the mother while the young escape through tiny apertures. It is far safer to restrict the mother to a small part of the aquarium by

means of a sheet of glass, a narrow space being kept for the passage of the babies, but most experienced aquarists prefer simply to stock the tank thickly with vegetation, and trust to this for protection for the young fishes, rather than risk the life of the mother in unnatural and cramped quarters. When emitted the young are about one-quarter inch in length, and able to take small crustacea and fine artificial foods almost from the very first. They grow rapidly, and under favorable conditions reach maturity in from two to three months. The adults may be given the dry preparations, with an occasional meal of animal food.

Next in popularity comes the Sword-tail Minnow (*Xiphophorus helleri*), a fish which for beauty and hardiness is most satisfactory. It is a native of Mexico, and well-grown specimens are from two and one-half to three inches in length. It is brilliantly colored, the sides being of iridescent blue and green, with a red lateral stripe extending the entire length of the fish. The male is characterized by the development of the lower portion of the tail, which terminates in a sword-like projection, about one inch in length and bright green in color. *Helleri*, as they are popularly known among their admirers, are generally inveterate persecutors of their young, and it is necessary to isolate the females if it is desired to breed them. Both young and adults may be treated as with the preceding, but the present species is somewhat more carnivorous in habit.

The genus *Gambusia* contains a number of small, pugnacious fishes, known as top-minnows. *G. holbrooki* is an excellent tank fish, and very popular among aquarists. It ranges from southern Illinois through the southern states into Mexico. The males of the typical form are whitish, thickly blotched with black, some specimens having the background entirely obscured. The female is considerably

larger than the male and plain olive in color. This fish is very abundant at certain points, inhabiting ponds, brooks and even ditches. It is found associated with males which lack the black spots, and are known as *G. affinis*. It seems probable that the two types represent mere color phases of one species, as the females are not separable, but little is known concerning this point. Wild-caught fishes do not always breed true to color, the young often reverting to the *affinis* phase, but strains of aquarium-bred fishes have been formed the progeny of which come true to type. This is a very prolific but exceedingly voracious fish, necessitating the seclusion of the mothers if any of the young are to be reared. It is hardy, does not require so high a temperature as many others, and will thrive on the usual foods, but because of its pugnacity cannot be associated with other species.

Several forms of *Platypœcilius* are popular among admirers of aquarium fishes. The best known is *P. maculatus*, a rather plainly colored olive fish, usually diversified by dark caudal spots and bluish sides. It rarely much exceeds an inch and one-half in length, but is very deep in comparison. There are various other handsomely colored forms, varying in color between the extremes of bright red and velvety black. Some have been named, but as they interbreed freely their specific standing is very much in doubt. All are quiet, harmless fishes, of vegetarian habit and easily kept.

*Pœcilia* is a very widespread genus, extending from Mexico to northern South America and the West Indies. There are many species, only a few of which have been kept in America. *P. sphenops, P. pavonina, P. amazonica* and *P. vivipara* are the best known. All are handsome, sociable fishes, subsisting chiefly on a vegetarian diet, and may safely be kept with other fishes.

*Alfaro cultratum* is one of the most interesting fishes of the live-bearing group. It is known only from the Caribbean slope of Central America, where it inhabits swift, stony-bottomed brooks. Well-grown specimens reach three inches in length and are olive in general color, with patches of brilliant blue and green on the body, and yellowish tail. The anal fin of the male is very far advanced, and in both sexes the space along the ventral line between this fin and the tail is occupied by a double row of scales which forms a curious, keel-like structure. The first specimens to reach this country were collected in Costa Rica by the writer, and have proved both hardy and prolific in captivity, taking kindly to the ordinary diet of aquarium fishes.

Some of the smallest known fishes belong to the genus *Heterandria*, of which a Mexican form, *H. formosa*, is the only species known among American fish culturists. Large females reach an inch and sometimes slightly more, but the males are never more than three-quarters of an inch in length and mature at much smaller size. It is an attractive fish, olive brown in color, with dark lateral stripe and dorsal spot. It is very hardy in the aquarium, breeding freely and sustaining itself with algæ and prepared food.

Certain small members of the *Cyprinidæ*, or carp group, are mentioned here, instead of with their allies, because the nature of their habitats necessitates their treatment being that of other tropical forms.

The genus *Barbus* contains a number of European and Asiatic species which grow to a very large size, but there are many smaller ones which are in favor with aquarists. They are harmless, fairly active fishes, rather broad in proportion to their length and often strikingly marked, although they do not present the brilliant colors of some other groups. *B. maculatus*, *B. ticto* and *B. vittatus* are some of the more familiar species. They are easily kept at warm

temperatures, may be associated with other small, quiet fishes and thrive on the ordinary foods.

The species of *Rasbora* are beautifully colored and otherwise attractive, but have a reputation for delicacy which, unfortunately, seems only too well founded. *R. heteromorpha,* the only species familiar to aquarists in this country, is a small, deep-bodied fish, reddish in general color, with a large, triangular, bluish-black spot covering the sides. To its brilliant color it adds active habits, and it is to be hoped that when its needs are better known it will prove longer-lived. At present we can only look to the temperature of its tank, provide it with plentiful crustacean food, as well as the best of artificial mixtures, and hope for the best.

*Danio* is a genus which includes several species that meet in every particular the needs of the tyro. Their bold and handsome markings, combined with extreme activity and perfect hardiness, make them ideal aquarium fishes. All bear on the lips two long, hair-like barbules, which are easily observed when the fish is in proper position.

The feeding habits of the various species are similar. They will take dry food readily, seizing it from the surface of the water in a series of lightning darts. They are exceedingly fond of living food, which should be provided as frequently as possible.

All are rather difficult to breed, but the feat may be accomplished if sufficient care is bestowed in the tank. When the eggs are laid, they do not adhere to the plants, but sink to the bottom, where, if undisturbed, they will hatch in a few days. The fishes, however, will persistently search them out and devour them, so they must be removed as soon as oviposition is seen to have occurred. Many breeders cover the bottom of the tank with rough stones, so that the eggs, falling into the interstices, may get beyond

reach. All tadpoles and snails should be removed, and precautions should be taken to free the tank of low forms of life, such as hydras, which will devour the tiny young. If the fry emerge safely, they will thrive on protozoans, and later on small crustacea and finely powdered dry food.

*Danio rerio,* a native of Ceylon, is the commonest species. It is boldly marked with broad stripes of brilliant blue, which extend across the tail and anal fin, the ground color being silvery in the females and yellowish in the males, the distinction being more strongly noticeable during the breeding season. Large specimens will average about an inch and one-half in length.

*Danio malabaricus* is an Indian form and the largest of the genus. Its sides are bright blue, with three well-marked, yellowish stripes. It is an exceedingly graceful fish, and while less active than the preceding, is nevertheless almost constantly in motion.

*Danio albolineatus* is really one of the most marvelously colored of fishes. Seen by properly reflected light its beauty is indescribable, and just why it is not more commonly kept is difficult of comprehension. When in full color, the entire fish scintillates with flashing opalescent hues of great brilliancy, the females being somewhat less strongly colored than the males. It is a species of lively disposition, and a few individuals in good condition form a spectacle not soon to be forgotten.

The Labyrinth Fishes (LABYRINTHINI) form a group of several families, all the members of which are distinguished by the possession of air chambers, which supplement the action of the gills in purifying the blood. By means of this adaptation the fish is able, especially in the case of the Climbing Perches (*Anabas*), to live out of water for some time; but, on the other hand, if it be deprived of coming to the surface to renew the supply of atmospheric air in the

chambers, it soon dies. Thus the labyrinth fishes are well suited for the aquarium, being able to take oxygen from the air as well as from the water.

They are hardy fishes, but most of the species, especially the Fighting Fishes (*Betta*), require a temperature of at least 68° to 70° Fahrenheit, and often are kept in heated tanks. Generally they are pugnacious and vindictive, and must be kept singly or in pairs. They are easily fed, readily taking prepared foods, which should be supplemented with occasional bits of scraped raw beef, chopped worms, boiled yolk of egg and living crustacea.

The breeding habits of these fishes are curious and most interesting. At the approach of the season of reproduction the male goes through an elaborate courtship, spreading his brilliant fins to their utmost extent, and scintillating with intense color. Soon the female responds, and the male commences the construction of the nest. This is composed of a mass of air-bubbles coated with a viscous substance secreted by a special gland, which causes them to adhere together. The bubbles are piled up in the form of a low cone, which floats on the surface of the water. Oviposition soon takes place, and the female must be removed at once, for the male, assuming charge of the nest, will not tolerate her presence. After two or three days the tiny young hatch and are carefully guarded by the father, which gathers up in his mouth any which fall from the nest and carefully returns them. Soon after hatching the young begin to leave the nest and move about in search of food. When this stage is reached he, too, must be removed, for parental affection vanishes, and he regards his offspring merely as an admirable addition to his menu. The fry feed, as do the young of most other fishes, on protozoans, and later on small crustacea and powdered dry food. Care must be taken not to feed crustacea until the young are large enough to eat them,

otherwise they themselves are likely to be destroyed. Young labyrinth fishes are exceedingly sensitive to change of temperature, which must be kept at an even point.

The Paradise Fish (*Macropodus viridi-auratus*) is the most familiar species. This fish has been kept and bred in the East for so many years that it is really domesticated, and great numbers are bred yearly in Europe and America. It is an extremely brilliant species, particularly during the breeding season, when the colors of the male are seen at their best. The upper parts are mottled in tones of brown, but the sides bear alternate stripes of rich greenish-blue and reddish-orange, the fins being bordered with deep blue. The intensity of color varies constantly with the temperature of the water and the mood of the fish. The dorsal and anal fins, and the points of the tail, in the male are produced to long wavy flagellæ, which greatly add to the grace and beauty of the specimen. At the breeding season the male may be distinguished by his heightened color and lengthened appendages, while at this time the female is usually almost flesh-colored, if in good condition.

Much nonsense has been written and spoken concerning the supposed delicacy of the Paradise Fish. It is said to die at once if water falls into the tank, if it is carelessly removed, or if there is a slight drop in temperature. As a matter of fact it is a hardy creature, remarkably tenacious of life, and not in the least affected by the conditions just noted. When a fish can fall down a flight of stairs, lie undiscovered on the floor for some time, and on the following day be none the worse for the experience, as recently happened to a specimen now in the collection of the writer, it is not to be classed as delicate.

Several species of Gouramis are attractive additions to the collection. All have the ventral fins far advanced and transformed into long antennæ-like threads, often of very

considerable length. The largest of the commonly kept species is the Striped Gourami (*Trichogaster fasciatus*), which reaches a length of four to five inches. It is rather sluggish and inactive, but the alternate perpendicular bands of red and blue which adorn its sides are wonderfully brilliant, especially when the fish is excited.

The Dwarf Gourami (*T. lalius*), true to its name, seldom exceeds one and one-half inches. It is much more active in habit than its larger relative and almost as brightly colored, having a blue ground with orange-red perpendicular bars, and red spots on fins and tails. The female is easily distinguished by her paler color and the absence of the blue spot on the gill covers. It is of quiet disposition and may safely be associated with other fishes.

The Spotted Gourami (*Osphromeus trichopterus*), although rather extensively kept, is not especially attractive. Except during the breeding season, it is olive in general color, with two darker spots on each side. When excited it assumes more intense coloration, but is not to be compared with its congeners.

The habits of the Fighting Fishes (*Betta*) are almost too well known to every one to need description here. The bellicose disposition of the fiery little male has been made the basis of a national sport in various eastern countries, especially in Siam. The fishes are bred with the greatest care and select strains, noted for their ability in battle, have been developed. The amateur will not have to be told that fishes of this group must be isolated.

All of the Fighting Fishes are brilliantly colored, the general type of marking being as in the preceding. The best known are the Common (*Betta pugnax*), the Red (*B. rubra*) and the Splendid (*B. splendens*).

The Climbing Perches (*Anabas*) represent the highest development of the air-breathing apparatus of the labyrinth

fishes. It is able to travel long distances overland, propelling itself by means of sharp spines on the gills and fins, or, in case of drought, to bury itself in the moist bottoms of dried-up pools and await the coming of rain. Some skepticism is shown as to its ability to ascend trees, but it has been recorded by good authorities that the fish can climb inclining trunks for a distance of several feet. This seems to require confirmation.

The best known species (*A. scandans*) is far from lovely, being of unattractive form and dull olive in color, but its curious habits recommend it to the aquarist. It is hardy and long-lived in captivity, and feeds well on the usual foods. Its tank must be kept carefully covered, to prevent it from jumping out.

The Cichlid fishes (CICHLIDÆ) are bass-like in general appearance, but are separated from this group by several important anatomical characters. There is a vast array of species, extending throughout tropical America, Africa and western Asia. From Mexico southward almost every stream has its own kind and sometimes several. In Costa Rica the writer has taken three distinct and gorgeous forms from a tiny brook not more than a foot in width. In British Guiana a narrow irrigation ditch swarmed with a very handsome species which could be scooped out in the hands. Many of these fishes are exceedingly brilliant in color.

These are hardy aquarium fishes, being mainly carnivorous, and thriving on scraped beef, chopped clams and worms, crustacea and prepared foods. They are quarrelsome in the extreme, and often even a pair cannot be kept together. If a pair can be induced to live amicably, they are not difficult to breed, when they form a most interesting family group. The eggs are deposited in a hollow in the sand, and fanned by the fins of the male until they hatch.

The young are cared for with great solicitude, being herded and watched by both parents. Some individuals may be left until the young are well reared, but it is safer to remove them as soon as the fry reach the age of three or four weeks. The young fishes will require finer food than that furnished the adults, otherwise their diet should be the same.

*Heros fasciatus* is the most familiar form, as well as one of the dullest, being of a pale olive color with dark perpendicular bands. *Cichlasoma nigrofasciatum* is bluish-black, with dark bars, and flecked with tiny points of bright blue. Many other forms of *Heros, Cichlasoma, Acara* and *Geophagus* have been imported at times, but these do not represent a tithe of those which exist.

A rather aberrant form of this group is a curious fish known as *Pterophyllum scalari.* The body is short and round, but the anal and dorsal fins are tremendously extended, and the ventrals are represented by two long, antennæ-like appendages which give the fish a most bizarre appearance. In color it is silvery with heavy black perpendicular bars. It is said to be found only at Manaos, on the Amazon, but much remains to be learned concerning its distribution. A pair which the writer saw in a private collection in Belgium, in 1912, were the first to reach Europe, and represented an outlay of 600 francs. A few of these fishes have been brought to America at one-fifth of this price or less. Because of their value, they generally are kept in heated tanks, and favored with live food.

Of the Old World Cichlids, the MOUTH-BREEDERS (*Paratilapia*) are of great interest. *P. multicolor,* the usual species, is from one and one-half to two inches in length and rather plainly colored, although it brightens during the breeding season. Its breeding habits, however, are most extraordinary. After the eggs have been deposited and

fertilized, they are taken in the mouth of the female, and there retained until they hatch. The male should be removed, and the female not disturbed for this time, during which she generally does not feed. After hatching the fry are cared for by the mother until they begin to move about freely, when she should be removed. Mouth-breeders should be fed as the other Cichlids are, but of course the food must be finer.

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